THE ASHTON VALVE COMPANY

CATALOGUE
No. 12
EDITION 1914

POP SAFETY AND RELIEF VALVES PRESSURE AND VACUUM GAGES

OFFICE AND WORKS
BOSTON, MASS., U. S. A.

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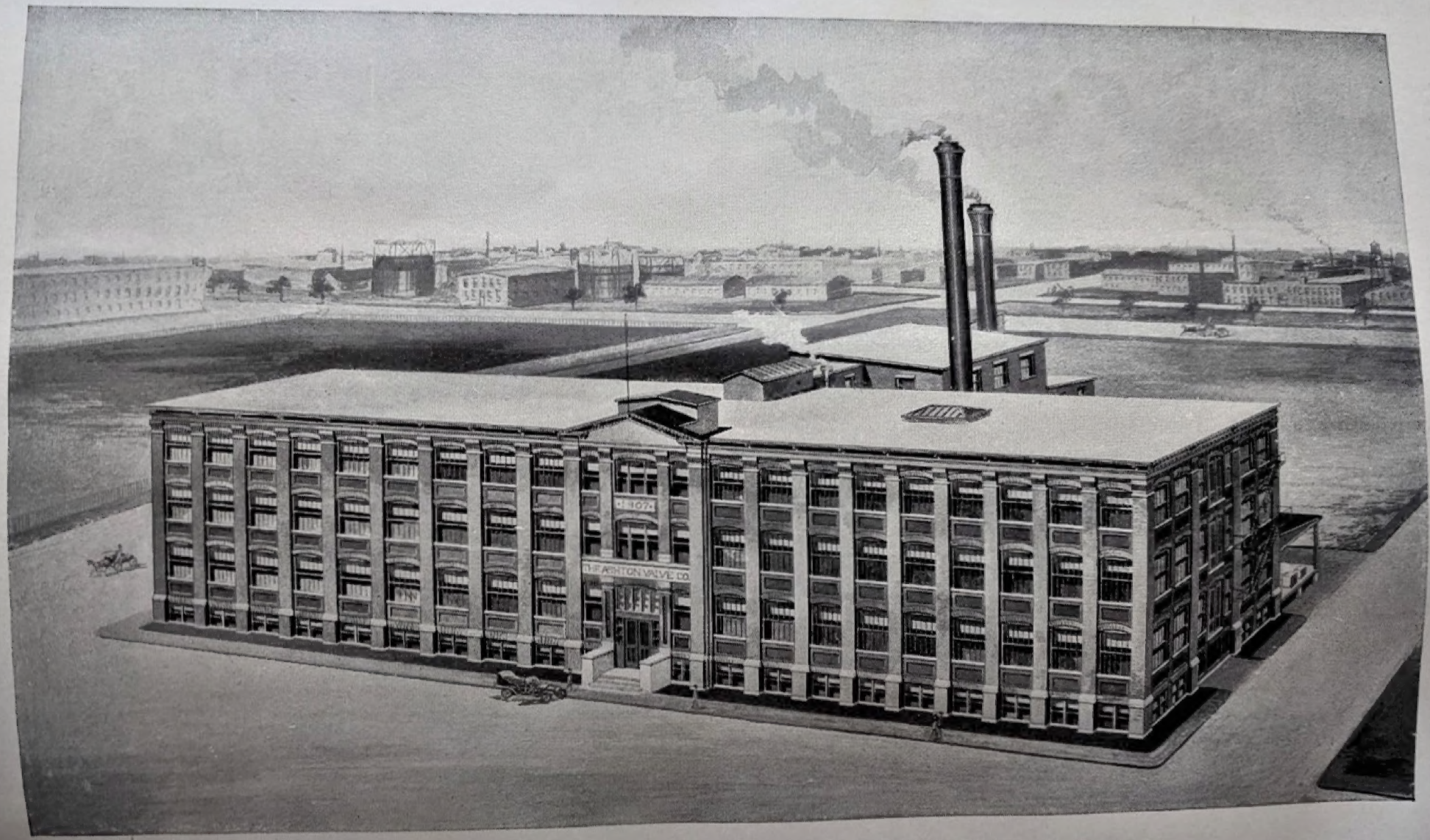

WORKS AT 161-179 FIRST ST., EAST CAMBRIDGE, MASS., U. S. A.

Established 1871. Incorporated 1877.

ELLERY PEABODY, President. JOSEPH W. MOTHERWELL, Vice-President.
ALBERT C. ASHTON, Secretary and Treasurer.

THE ASHTON VALVE COMPANY

MANUFACTURERS OF THE

ASHTON LOCK-UP "POP" SAFETY VALVES

FOR LOCOMOTIVE, STATIONARY, MARINE,
AND PORTABLE BOILERS

Ashton Water Relief Valves, Hydraulic Relief Valves, Cylinder Relief and Snifting Valves,

Blow-off Valves, Steam Vehicle Fittings, Ashton Chime Whistles,

ASHTON PRESSURE AND VACUUM GAGES

ALSO

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HENRY G. ASHTON,
Founder of
The Ashton Valve Company.

MEDALS AWARDED TO THE ASHTON VALVE COMPANY

Besides Gold and Silver Medals at St. Louis Exposition, 1904

Ashton Patents in General

COVER BROADLY THE MOST VALUABLE AND DESIRABLE IMPROVEMENTS IN POP SAFETY VALVES AND GAGES MADE IN RECENT YEARS. IT HAS BEEN OUR AIM AND STUDY TO DEVISE THE MOST PRACTICAL, EFFICIENT, AND DURABLE GOODS POSSIBLE IN THE STATE OF THE ART. BY CONSTANT AND CAREFUL ATTENTION, WE KEEP OURSELVES FULLY INFORMED OF ALL MERITORIOUS INVENTIONS OF OTHERS, AND DO NOT HESITATE TO STRENGTHEN OUR POSITION BY PURCHASING SUCH AS ARE OF VALUE.

Introductory.

IN presenting our 1914 revised edition catalogue, we respectfully invite the attention of those interested in engineering appliances to the several meritorious changes and additions to our long established line. We have constantly endeavored to keep well in advance of the state of the art consistent with the progress in engineering and its ever changing requirements. To this end we have developed and introduced many desirable improvements adaptable to high pressure and superheat steam service, as well as features to insure greater durability and efficiency.

For over forty years, or since the establishment of our business in 1871, our aim has been to excel in the manufacture of the most reliable goods of absolutely dependable quality. The reputation of the Ashton product is thereby maintained to the highest standard, and so recognized generally. We particularly solicit the trade of those who discriminate for quality in preference to first cost.

Our manufacturing facilities are second to none, with a large new factory of most modern construction, fully equipped with special machinery and desirably located in Cambridge, Mass., within easy access to railroad and steamship lines, enabling prompt deliveries.

We desire to express our appreciation to those who, by their many evidences of good-will and co-operation, have enabled our business to grow to its present magnitude, and to assure those contemplating future business relations with us, that no effort will be spared to merit their unqualified confidence.

THE ASHTON VALVE COMPANY.

BOSTON, 1914.

The Ashton Lock-up Pop Safety Valves.

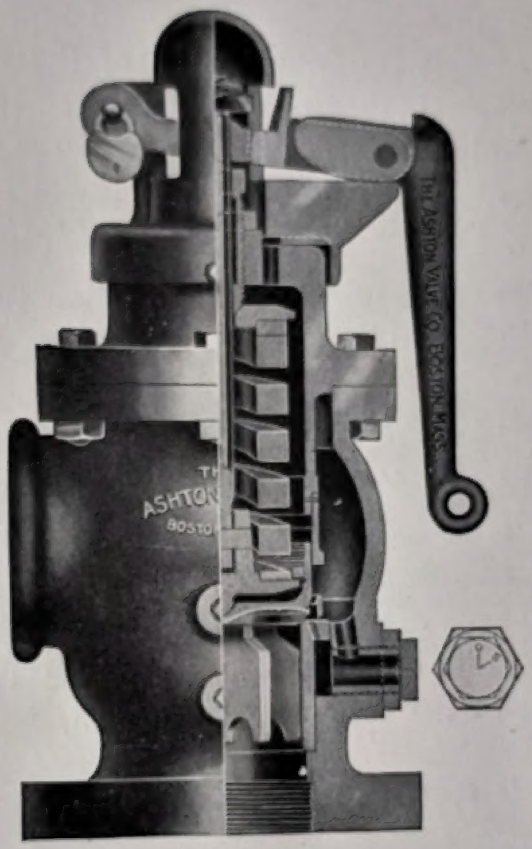
GENERAL DESCRIPTION.

THE mechanical principles upon which our valves are constructed, and the philosophy embodied in their proportions, make them the most perfect and efficient safety valves of which we have any knowledge. When of suitable capacity, these valves give instant and perfect relief to the boiler, and it is impossible to accumulate pressure above the point at which they are set. They are sensitive in action and always reliable. At the given pressure the valve will rise, and cannot be stopped blowing until the relief is given, when the valve will close itself, being perfectly automatic in its working, with nothing to disarrange or get out of order.

The Ashton Pop Safety Valves have now been on the market for more than forty years, during which time they have met with unusual success and held an unequaled reputation. It has always been the policy of the company to make their product in quality of material and workmanship the best possibly attainable in the state of the art. The result is that Ashton goods are recognized as being the most reliable and durable. Their points of mechanical superiority are explained in detail on the following pages, 11, 12, and 13, and, as will be appreciated by all mechanics, architects, and engineers, embody many meritorious features of great practical value.

The Ashton Improved Lock-up Pop Safety Valve.

(Patented.)



No. 20.

(Improved.)

POINTS OF MECHANICAL SUPERIORITY.

BEVEL SEATS.

ALL Ashton Valves are made with bevel seats at an angle of 45 degrees, same as United States Government standard. Bevel seats always keep tighter than flat seats, and are easier to grind in or face off when repairs are necessary.

COMPOSITION, OR NICKEL SEATS.

Our standard seat is made of an extra high quality composition metal equal to United States Government standard, with great wearing qualities, and free from corrosion. *Nickel seats* of the highest grade, however, are furnished, when preferred.

POINTS OF MECHANICAL SUPERIORITY.—*Continued.*

PATENTED MAIN "POP" CHAMBER WITH KNIFE-EDGE LIP.

The "pop" chamber in Ashton Valves is of special design. It is the chamber as surrounded by the patented knife-edge lip and inclosed within the walls of this lip and the top of the bushing and valve seat. The knife-edge lip wears down in proportion to the wear of the seat of the valve, thus keeping the outlet of the "pop" chamber of the same relative proportion to the inlet, giving an unvarying "pop" and insuring long service without readjustment of repairs. Other makes of valves of the so-called adjustable screw-ring construction require frequent adjustment to prevent increased "pop" and unnecessary loss of steam.

SUPPLEMENTAL "POP" CHAMBER.

In Iron Body and Locomotive valves the patented supplemental "pop" chamber is introduced. This chamber is connected with the primary "pop" chamber by a series of holes through the bushing, and serves the purpose of making a close regulation of the "pop" by the adjustment of its outlet passage into the discharge chamber, as further explained in the following paragraph.

OUTSIDE "POP" REGULATOR.

The patent screw plug "pop" regulator H, on the outside of our valves, free from corrosion or any possible chance of sticking, affords means of regulating the "pop" of the valve at all times without taking the valve apart, and when steam is on the boiler. By use of this regulator, any desired "pop" can be obtained down to the finest regulation, thus reducing the waste of steam to a minimum. Full explanation how to regulate given on page 15.

EXTRA QUALITY SPRINGS.

All our "pop" valve springs are made in our own factory, of Jessop's best steel, and have no superior in the world. They are ground perfectly square on the ends, and before being put into use are subjected to the severest test that can be given them.

PIVOTED SPRING DISKS.

In order to make the spring have a true bearing on the valve, it is fitted with pivoted top and bottom disks.

POINTS OF MECHANICAL SUPERIORITY.—*Continued.*

BLOW-BACK HEAD AND ENCASED SPRING.

All Steam Valves are made with *our patent blow-back head,* forming a chamber inclosing the spring and protecting it from the great volume of steam. It also makes an additional guide for the valve above the seat. This spring chamber is vented at the top, and thereby offers the great advantage of piping the discharge of any number of valves together, or through any length of pipe having innumerable elbows, and yet the valve will not be loaded with back pressure. Other pop valves under such circumstances would have a dangerous back-pressure on top of the valve. This is impossible with the Ashton patent blow-back head or vented spring chamber.

ADVANTAGEOUS BASE OUTLET CONSTRUCTION.

Another feature of great advantage to engineers is that the inlet and outlet of all large-size valves are both on the base casting, whereby the valve can be taken apart and reground, or otherwise repaired, without breaking boiler connection or outlet pipe.

LOCK-UP ATTACHMENT.

Most valves are furnished with lock-up attachment, which prevents the regulating parts from being tampered with by evil-disposed persons.

ADJUSTABLE CAM LEVER.

Our patented trip lever can be easily changed to operate in any direction desired, regardless of the position of the outlet of the valve. It also has the power to lift the valve off its seat at any pressure by hand, which is impossible with the single straight lever style.

TESTING-CLAMPS.

All valves are furnished with testing-clamps when requested, and at no extra expense. These are of special benefit when the boilers are tested, obviating the necessity of changing the adjustment of the valve, and preventing an undue strain on the spring.

The Ashton Improved Lock-up Pop Safety Valve.

FOR LARGE STATIONARY AND PORTABLE BOILERS.

Thirteen Highest Premiums awarded, both Gold and Silver Medals.

(Patented.)

No. 20. (Improved.)

Particularly adapted for Boilers for Mills, Factories, Electric Light and Power Plants, Pumping Stations, etc.

This valve has an acknowledged reputation not equaled by any other pop safety valves now on the market. It embodies many valuable patented improvements, including the following:

SPECIAL FEATURES.

Bevel seats at angle of 45 degrees and of highest grade composition steam metal. Nickel seats, extra quality, furnished when desired. Pop chamber with knife-edge pop lip, which wears evenly with valve seat. Encased spring chamber, protecting spring from steam and forming upper guide for valve. Springs of Jessop's steel wound by hand in our own factory. Pivoted top and bottom disks for spring, to insure a true bearing on valve. Screw plug pop regulator to easily regulate pop from outside without taking valve apart. Compound adjustable cam lever, readily changed to stand in any desired position. Lock-up attachment to prevent tampering with adjustment. Working parts of valve entirely of high-grade composition metal. Base outlet construction not necessitating removal of outlet pipe to grind in or repair valve. All as explained in detail on pages 11, 12 and 13.

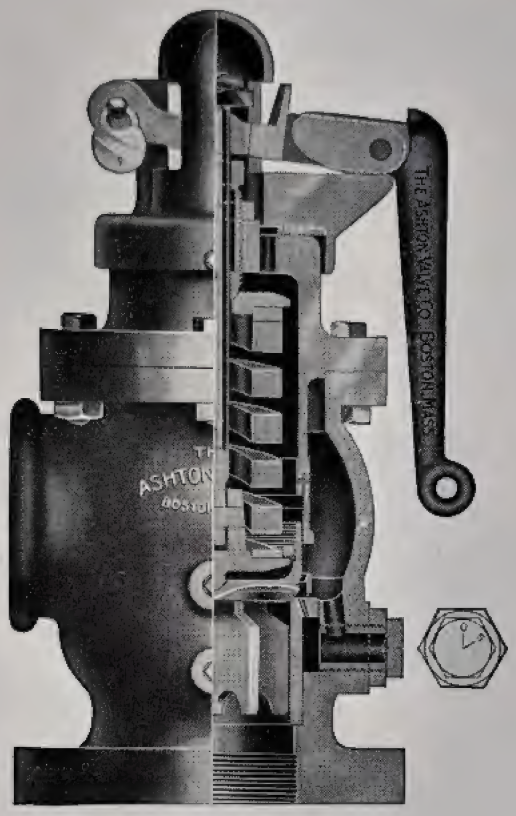
The Ashton Improved Lock-up Pop Safety Valve

FOR LARGE STATIONARY AND PORTABLE BOILERS.

Adopted by the United States Government, recommended by leading architects and engineers with a record of more than forty years' service.

(Patented.)

Valves sent on trial subject to approval only if entirely satisfactory.



No. 20.
(Improved.)

DIRECTIONS.

TO CHANGE SET PRESSURE unlock padlock and remove lock, pin, and lever. Take off cap by unbolting, thus exposing pressure screw. Slack check nut on screw and turn screw downward for increased pressure or upward for less pressure. Afterwards set up check nut. When it is desired to change set pressure more than fifteen pounds above or below original set pressure, new springs should be ordered to obtain the greatest efficiency.

TO CHANGE "POP," or the amount of reduction in pressure when the valve operates, it is *not necessary* to take the valve apart in any way. This can be accomplished by means of the patent screw plug pop regulator H on the outside back part of the valve. If more pop is desired, slack the check nut and turn regulator slightly to the left, so that letter S stands nearer perpendicular, or for less pop turn regulator to the right until letter O is nearer perpendicular. One-sixth of a turn of this regulator gives the full range of adjustment.

PRICE LIST.

Size Valve	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price	$30	$40	$55	$64	$70	$80	$85	$105	$125
Diameter of Inlet Flange	7 in.	8 in.	9 in.	10 in.	10 in.	12 in.	12 in.	14 in.	14 in.

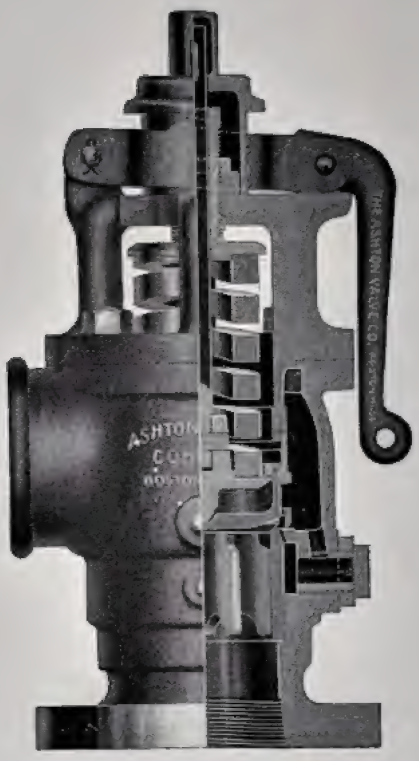
Write for Discounts.

When ordering always state highest working pressure, and whether flanged or screwed inlets are desired.

The Ashton Improved Outside Spring Pop Safety Valve.

FOR USE ON SUPERHEATERS.

No. 17.
(Steel.)



The Ashton Outside Spring Pop Safety Valve is constructed with *body of cast steel*, with the *valve part* and *seat bushing* of solid nickel. The *spring* is of Jessop's steel, outside the valve body, and is never in contact with the steam, which would affect the temper. It has *compound lifting attachment* easily raised by hand, and the set pressure adjustment is *locked* to prevent tampering. This valve has proven the most satisfactory on superheat installations, and can therefore be consistently guaranteed to give perfect satisfaction.

For points of mechanical superiority, see pages 11, 12, and 13.

PRICE LIST.

Size Valve	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price	$60	$80	$110	$128	$140	$160	$170	$210	$250
Diam. Inlet Flange .	7 in.	8 in.	9 in.	10 in.	10 in.	12 in.	12 in.	14 in.	14 in.

Write for Discounts.

When ordering always state highest working pressure, and whether flanged or screwed inlets are desired.

The Ashton Twin Stationary Pop Safety Valve.

No. 20A.
(Duplex.)

It is fast becoming the practice in the large stationary boiler service, particularly in connection with water tube boilers, and where it is not feasible to apply one large valve, to equip boilers with valves made in the twin form, the two valves having a total area equal to that of the proper sized single valve. By this form of construction but one valve connection is necessary on the boiler, and with the valve parts made in one casting, and having one common discharge outlet, there is therefore but one outlet connection.

The above cut shows the Ashton Twin Stationary Valve, which is made with iron body and interior working parts same as the No. 20 style valve, as explained in detail on pages 11, 12 and 13.

PRICE LIST.

Size Valve ...	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price	$70	$90	$125	$145	$155	$175	$190	$235	$280
Diameter Inlet Flange	8¼ in.	9 in.	10 in.	12 in.	14 in.	15 in.	15 in.	16 in.	17 in.
Diameter Outlet Flange...	7½ in.	8½ in.	9 in.	9 in.	10 in.	11 in.	11½ in.	11½ in.	12 in.

Write for Discounts.

The Ashton Pop Safety Valves.

FOR SMALL STATIONARY AND PORTABLE BOILERS.

(Patented.)

No. 6.

VALVE WITHOUT CAP OR LEVER.

No. 7.

VALVE WITH CAP ONLY.

THESE valves are made of high-grade composition metal, and the springs of Jessop's steel. They give perfect relief, are solid in construction, and durable.

No. 6. VALVE has patented knife-edge pop lip, encased spring, pivoted disks, and open discharge outlet.

No. 7 VALVE is similar, but is furnished with top cap to cover and protect pressure screw.

TO CHANGE PRESSURE on these valves, slack check nut and turn pressure screw down for increased pressure or upward for less pressure, then set up check nut. When it is desired to change set pressure more than 15 pounds above or below original set pressure, new springs should be ordered to obtain the greatest efficiency.

PRICE LIST.

Size Valve	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
No. 6 Valve. Price	$4.50	$6.50	$8.50	$10.00	$20.00	$32.00	$40.00
No. 7 Valve. Price	5.00	7.00	9.00	10.50	20.50	33.00	41.00

Write for Discounts.

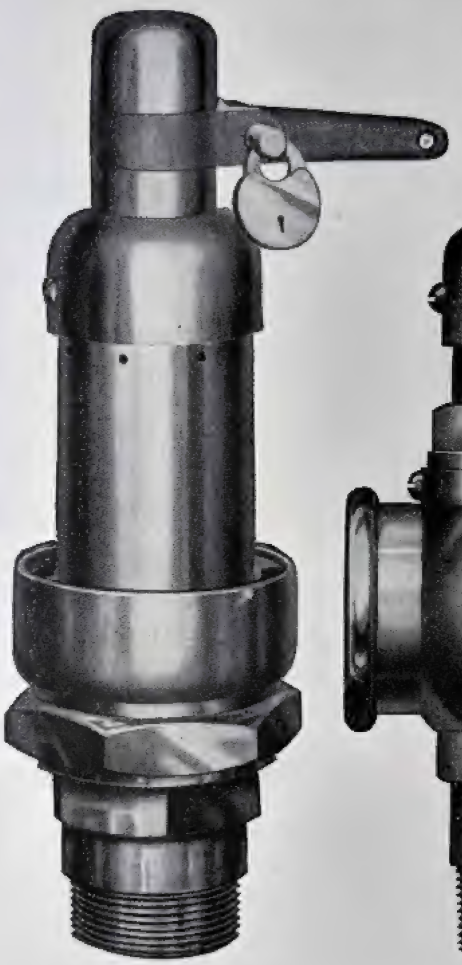
When ordering always state highest working pressure.

The Ashton Lock-up Pop Safety Valves.

FOR SMALL STATIONARY AND PORTABLE BOILERS.

(Patented.)

No. 8.



VALVE WITH LOCK-UP, LEVER, AND OPEN DISCHARGE.

No. 9.

VALVE WITH LOCK-UP, LEVER, AND PIPE OUTLET.

THESE valves are recommended for small-size stationary or portable boilers They are made throughout of the best composition metal, with the exception of the springs, which are of Jessop's steel; automatic in relief, durable, and efficient.

No. 8 VALVE has lock-up attachment, trip lever, patented knife-edge pop lip, encased spring, pivoted disks, and open discharge outlet.

No. 9 VALVE is the same as the No. 8 Valve, but with the additional improvement of having pipe outlet.

PRICE LIST.

Size Valve	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
No. 8 Valve. Price	$6.00	$8.00	$10.00	$12.00	$22.00	$34.00	$48.00
No. 9 Valve. Price	7.00	9.00	11.00	14.00	25.00	40.00	50.00

Write for Discounts.

When ordering always state highest working pressure.

The Ashton Steam Vehicle Fittings.

Pop Safety Valves.

The Ashton Valves for steam carriages, as here shown, are compact in form and solidly constructed for high pressure service, thus insuring their remaining tight and not causing trouble by leaking. Every valve is carefully tested and set to work at the desired pressure, and ready for application.

No. 31 Valve, With Open Discharge.

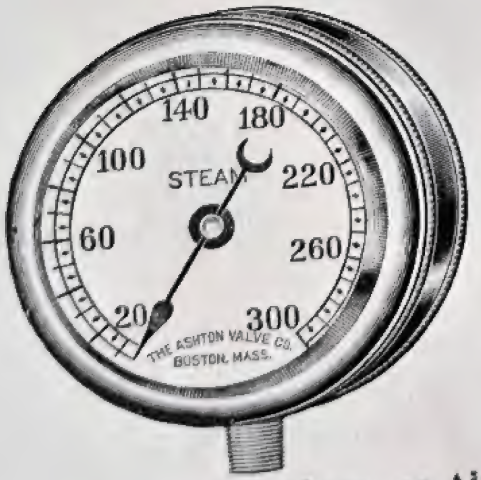
PRICE LIST.

Size, inches.	Price, No. 31.	Price, No. 32.	Weight, ounces.
1/8	$4.50	$4.50	8
1/4	4.50	4.50	8
3/8	5.00	5.00	13
1/2	5.00	5.00	14
3/4	6.00	6.00	30

No. 32 Valve, With Pipe Outlet.

The Ashton Steam and Air Gages

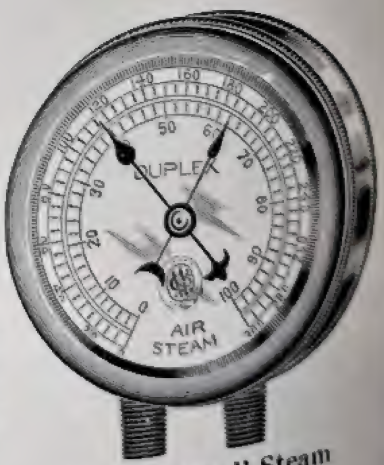
FOR STEAM VEHICLES.



No. 51 A. Steam or Air Gage.

THE No. 51 A. GAGE is particularly designed to meet the requirements of steam carriage users. It is neat, light, durable, and accurate, made with bevel glass for protection, and with or without flange on back. It is equally adaptable for Steam or Air pressure, and the dials are so designated.

THE No. 66 "DUPLEX" GAGE has combined in one case both the Steam and Air pressure gage as commonly used on steam vehicles. It is compact in form and neat in appearance. The Air pressure gage hand and figures on dial are red, to distinguish from the Steam gage hand and graduations, which are black.



No. 66A "Duplex" Steam and Air Gage.

PRICE LIST.

Size Dial.	Brass Case.	N. P. Case.	Weight, lbs.
No. 51 A., 3 in. Steam or Air Gage	$8.00	$8.60	1¼
No. 51 A., 2½ in. Steam or Air Gage	8.00	8.60	¾
No. 51 A., 2¼ in. Steam or Air Gage	8.00	8.60	½
No. 66 "Duplex," 3 in. Steam and Air Gage	16.75	17.00	1½

Write for Discounts.

The Ashton
District Police Lock Pop Safety Valve.

FOR LOW PRESSURE HEATING BOILERS.

Complying with the Latest Revised Laws of the States of Massachusetts and Ohio.

Accepted and approved by the Board of Boiler Rules and the Chief of the District Police, October 3, 1907.

No. 14.

These valves when applied to heating boilers carrying a pressure of not over 15 lbs. per square inch will permit the operation of the boilers without requiring a licensed engineer or fireman.

Table of maximum grate area allowable for each size safety valve.

DIAM. VALVE.	GRATE AREA.
2 in.	7.9 sq. ft.
2½ "	12.3 " "
3 "	17.6 " "
3½ "	24. " "
4 "	31.4 " "

Boilers having over 31.4 sq. ft. of grate area require two safety valves.

The Ashton Police Valve, as shown in above cut, has full area under discharge outlet preventing dust or dirt from getting into the interior working parts. It is made with long trip lever capable of raising the wing valve part off its seat one-fourth the diameter of the valve. The spindle is directly connected to the wing valve. The spring is of good length and made of Jessop's steel. The working parts are of high-grade composition metal, insuring great durability, and the adjustment is locked up to prevent tampering. A standard lock is furnished on all valves.

PRICE LIST.

SIZE	PRICE.
2 inch	$30.00
2½ "	50.00
3 "	65.00
3½ "	80.00
4 "	100.00

Write for Discounts.

Hartford Statistics.

Figures furnished by the Hartford Steam Boiler Inspection and Insurance Company, Hartford, Conn., from the reports to them from their inspectors among the various steam plants in the country. Look at the results:

Year.	Safety Valves Overloaded.		Safety Valves Defective.	
	Whole No.	Dangerous.	Whole No.	Dangerous.
1887	433	139	423	146
1888	473	146	542	176
1889	542	167	713	221
1890	535	159	795	254
1891	675	193	804	242
1892	701	210	947	301
1893	723	203	942	300
1894	835	267	1,159	378
1895	954	270	1,209	369
1896	900	270	1,264	326
1897	764	292	1,066	317
1898	691	263	913	251
1899	972	433	1,028	275
1900	1,003	398	1,077	354
1901	1,180	438	932	323

From organization of the Company to January, 1902:

Total number of safety valves found overloaded 12,789
Total number of safety valves defective 15,591
Total number of safety valves found to be in a *dangerous* condition 7,215

MORAL. — Use the Ashton Lock-up Pop Safety Valves, that cannot be tampered with or overloaded, and the construction of which is the most simple, durable, and reliable of any made. The Ashton fills the bill.

The Ashton
Cam Lever Marine Pop Safety Valve.

Our Marine Pop Valves are extensively used, have exceptional merit, and possess an unequaled reputation. During the past few years a large number of famous American Steamship and Steam Ferry Companies, together with several Foreign Transportation Companies, have adopted the "Ashton" as their standard in preference to the cheaper class of valves heretofore used.

They have received the official indorsement of the Chief Engineer of the United States Navy, and have been applied to many of the latest battleships, cruisers, and gunboats.

The Ashton Marine Valve embodies all the valuable features of the Ashton Pop Safety Valves, described on pages 11, 12, and 13, and in addition has our patent Cam Lever attachment whereby the valve can be lifted off its seat by hand, even more than the requirement of the government. It is one of the few valves that conforms promptly, fully, and efficiently to this requirement. (See page 24).

The Ashton
Noiseless Marine Pop Safety Valves.

By a special method of application the Standard Ashton Marine Pop Valve, embodying as it does our patent blow-back head, described on page 13, can be made to give perfectly noiseless relief, which feature is of inestimable value in marine service. This special method for accomplishing this greatly desired result is obtained by piping the outlet of the valve down the inside of the hull and out into the water below the surface water-line, where the steam from the valve as it blows off is discharged *noiselessly* and *unseen.* THERE IS NO EFFECTIVE BACK PRESSURE on top of the valve.

The Ashton
Cam Lever Marine Pop Safety Valves.

The General Rules and Regulations as prescribed by the United States Board of Supervising Inspectors of Steam Vessels, as amended, requires that all pop safety valves shall be equipped with a lever capable of lifting the valve off its seat one-eighth the diameter of the valve opening. The seats of all such valves shall be beveled at an angle of 45 degrees.

All pop safety valves shall have an area of not less than one square inch of valve area to every three square feet of grate surface, with the exception of water-tube or coil and sectional boilers required to carry a pressure exceeding 175 pounds per square inch, in which case one square inch of valve area to six square feet of grate surface is allowable.

Valves in twin form are permissible, providing the combined area of such valves is equal to that required for one valve.

In all cases pop safety valves shall be approved by the Board of Supervising Inspectors.

The Ashton Cam Lever Marine Pop Safety Valves, as illustrated and described on pages 23 to 29 inclusive, fully comply with the above Rules and Regulations of the United States Board of Supervising Inspectors.

The Ashton
Cam Lever Marine Pop Safety Valve.

According to the Rules and Regulations as prescribed by the United States Board of Supervising Inspectors of Steam Vessels (see page 24), the following size Ashton Marine Pop Safety Valves are required for boilers having grate surfaces as below:

¾	inch	Pop	Valve	for	1.32	square feet of grate surface.	
1	"	"	"		2.35	"	"
1¼	"	"	"		3.67	"	"
1½	"	"	"		5.30	"	"
2	"	"	"		9.42	"	"
2½	"	"	"		14.72	"	"
3	"	"	"		21.20	"	"
3½	"	"	"		28.86	"	"
4	"	"	"		37.69	"	"
4½	"	"	"		47.71	"	"
5	"	"	"		58.90	"	"
5½	"	"	"		71.27	"	"
6	"	"	"		84.82	"	"

For pressures exceeding 175 pounds per square inch, and where either water-tube or coil and sectional boilers are used, the following size Ashton Marine Pop Safety Valves are required for boilers having grate surfaces as below:

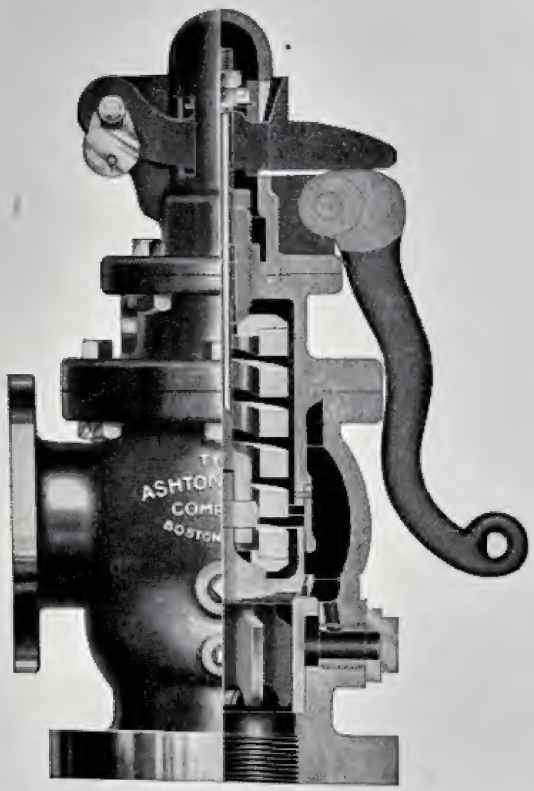
¾	inch	Pop	Valve	for	2.64	square feet of grate surface.	
1	"	"	"		4.70	"	"
1¼	"	"	"		7.34	"	"
1½	"	"	"		10.60	"	"
2	"	"	"		18.84	"	"
2½	"	"	"		29.44	"	"
3	"	"	"		42.40	"	"
3½	"	"	"		57.72	"	"
4	"	"	"		75.38	"	"
4½	"	"	"		95.42	"	"
5	"	"	"		117.80	"	"
5½	"	"	"		142.54	"	"
6	"	"	"		169.64	"	"

The Ashton
Cam Lever Marine Pop Safety Valve.

WITH LOCK-UP ATTACHMENT.

(Patented.)

No. 16



Adopted by the United States Board of Supervising Inspectors of Steam Vessels. Approved and accepted by the United States Navy Department and Lloyd's Register.

This valve is especially adapted for marine service on steamships, towboats, steam yachts, etc., and is the standard valve on many of the large steamship lines. It is in use on several of the latest United States battleships, cruisers, and gunboats, having been accepted by the Chief Engineer of the United States Navy. Explained in detail on pages 11, 12 and 13.

The several advantages in the Ashton Cam Lever Marine Pop Valve, as explained on page 23, show conclusively the superiority of the valve, and give it the high reputation it possesses.

Unless otherwise stated, all marine valves above 2-inch size are made with flanged inlet and outlet.

In ordering always state highest working pressure.

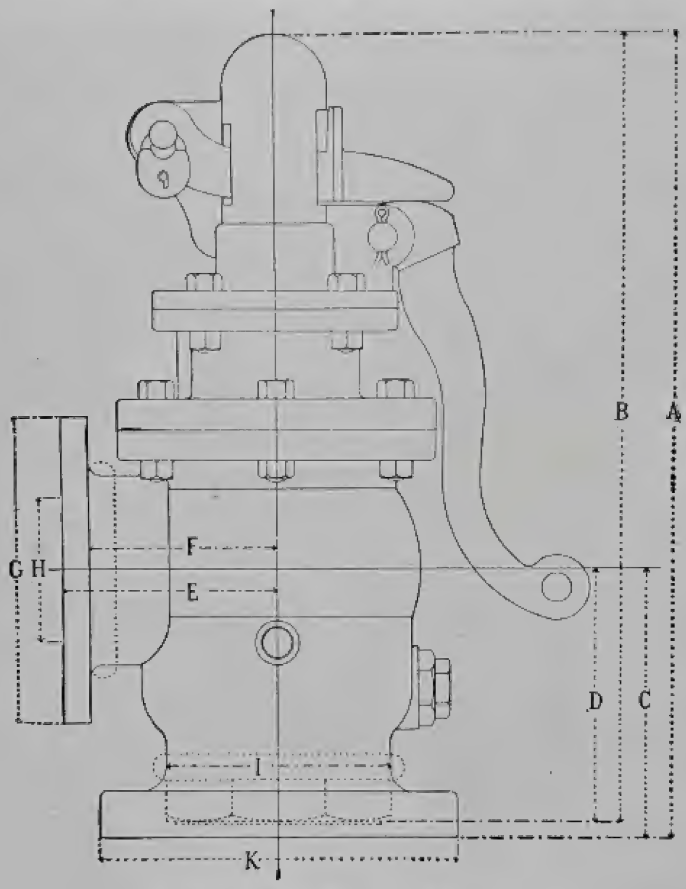
"Nickel Seated" valves furnished when desired.

PRICE LIST.

Size Valve	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price	$38	$48	$66	$75	$84	$95	$102	$125	$150
Inlet Flange.....	...	8 in.	9 in.	10 in.	10 in.	12 in.	12 in.	14 in.	14 in.
Outlet Flange....	...	7 in.	7½ in.	8 in.	8½ in.	9 in.	9½ in.	10 in.	10½ in.

Write for Discounts.

Dimension Sheet of No. 16 Ashton Marine Valve.



No. 16.

DIMENSIONS IN INCHES.

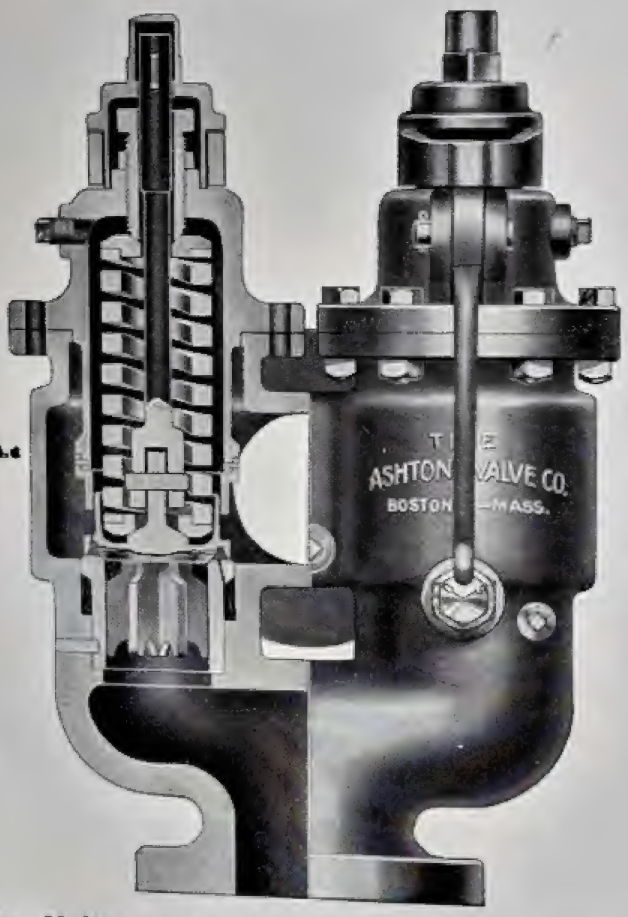
Sizes.	A	B	C	D	E	F	G	H	I	K
2½	17¾	17½	6¼	6	4¾	4⅛	7	2½	4⅜	8
3	20⅛	20⅛	6¾	6¾	5¼	4½	7½	3	5⅛	9
3½	21¼	21¼	7¾	7¾	5¾	5¼	8	3½	5¼	10
4	21⅝	21¼	7⅜	7⅛	6	5¼	8½	4	6¼	10
4½	23⅛	23⅜	7⅝	7⅞	6¼	5⅝	9	4½	6¾	12
5	25⅛	25⅜	8¼	8½	6⅝	6	9½	5	7¼	12
5½	30	29¾	8¾	8½	7	6½	10	*5½	8⅛	14
6	31	31¼	9	9¼	7¼	6¾	10½	6	9	14

* When screw outlet is used it is cut for 5-inch pipe.

The Ashton Twin Cam Lever Marine Pop Safety Valve.

WITH LOCK-UP ATTACHMENT.
(Patented.)

No. 16A.
(Duplex.)



Adopted by the United States Board of Supervising Inspectors of Steam Vessels. Approved and accepted by the United States Navy Department and Lloyd's Register.

The valve as shown in the above cut is designed throughout to meet the demand where it is desired to use an iron body valve of the twin form. These valves are made under the same patents as our No. 16 valve, as shown on page 26.

The several meritorious features in the Ashton Twin Cam Lever Marine Pop Valves are more fully explained on pages 11, 12, 13 and 23.

These valves are also made in triplex and quadruple pattern.

PRICE LIST.

Size Valve	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price (Iron Body)..	$85	$110	$150	$170	$190	$215	$230	$280	$340
Diam. Inlet Flange.	8¼ in.	9 in.	10 in.	12 in.	14 in.	15 in.	15 in.	16 in.	17 in.
Diam. Outlet Flange	7½ in.	8½ in.	9 in.	9 in.	10 in.	11 in.	11½ in.	11½ in.	12 in.

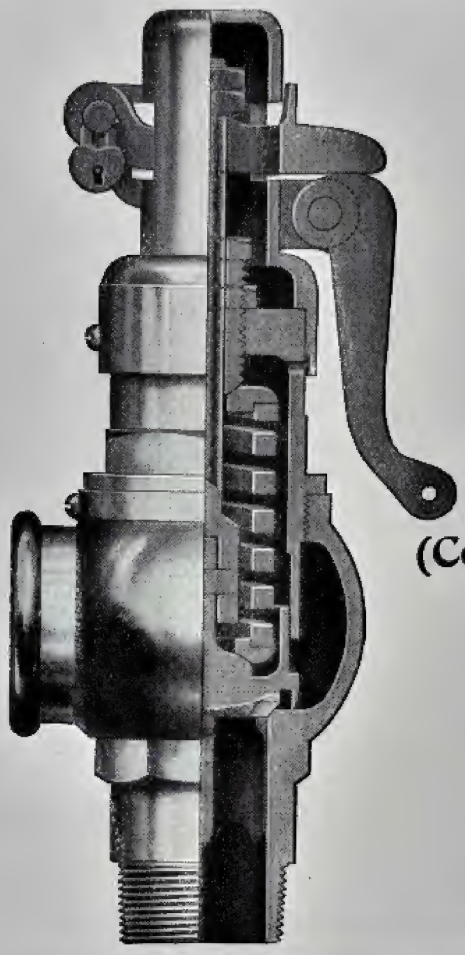
Write for Discounts.

Special United States Navy Style Composition Twin, Triplex, or Quadruple Marine Valves quoted upon application, when accompanied with specifications.

The Ashton
Cam Lever Marine Pop Safety Valve.

WITH LOCK-UP ATTACHMENT.

(Patented.)



No. 15.
(Composition.)

This valve is made of composition metal, finely finished, and is recommended more especially for steam yachts. It has bevel seat, encased spring, cam lever lifting-attachment, and fully complies with the rules and regulations of the United States Board of Supervising Inspectors of Steam Vessels. The valve has pipe outlet, so that the steam discharge may be carried outside boiler room. These valves are made with flanged connections to order, at special prices.

PRICE LIST.

Size Valve	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.
Price	$7.20	$9.00	$12.00	$14.40	$25.00	$40.00	$55.00	$70.00

Write for Discounts.

In ordering always state highest working pressure.

The Ashton Muffler Attachments for Stationary and Marine Pop Safety Valves.

No. 4.

The above cut shows in outline an Ashton No. 20 Stationary Valve fitted with a muffler attachment on the outlet. This attachment is adapted for use with any of our stationary or marine valves, and may be applied direct to the outlet of the valves or at the end of the outlet pipe. It effectually muffles the noise of the escaping steam when the valve is blowing without impairing the efficiency. Its use is not confined to muffling the escape from the safety valves, as it is equally effective when applied to any pipe from which there is a noisy escape of steam.

PRICE LIST.

Size	2 in.	2½ in.	3 in.	3½	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price.....	$8	$9	$12	$14	$16	$18	$20	$22	$24

Write for Discounts.

The Ashton Valve Testing Clamps.

These are furnished with our Stationary and Marine Pop Safety Valves when desired, at no extra expense. They are of special value when boilers are tested, for by their use the Pop Safety Valve does not have to be taken off, nor is it necessary to in any way change the original adjustment of the set pressure of the valve, thus saving the valve spring from excessive and undue strain. The clamps are easily applied, after first removing the valve cap, by placing the ends of the clamp arms beneath the flange of the valve top and then setting down the clamp screw on to the top of valve stem, thus holding the valve rigidly on its seat. After test is over, remove clamp and replace cap on valve, when it will be found that valve will work perfectly at exactly same pressure as originally set.

Don't forget to remove clamp after test is over.

The Ashton Standard Yokes.

No. 11

The Ashton Standard Yokes as illustrated above are made of the same quality metal as our No. 20 and No. 16 valves, and are guaranteed to be free from blow holes and other defects. They are of an extra heavy pattern, and particular attention is given that they may meet the requirements as demanded by the users of safety valves.

PRICE LIST.

Size	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price	$14	$18	$22	$24	$26	$30	$35	$42	$50
Diameter Top Flanges	7 in.	8 in.	9 in.	10 in.	10 in.	12 in.	12 in.	14 in.	14 in.
Diameter Bottom Flanges	8 in.	8 in.	9 in.	11 in.	12 in.	13 in.	14 in.	15 in.	16 in.
Diameter Inlet Hole	3 in.	3½ in.	4¼ in.	5 in.	5¾ in.	6⅜ in.	7 in.	7⅞ in.	8½ in.

Write for Discounts.

The Ashton Water Relief Valve.

SMALL COMPOSITION PATTERN.

No. 24.
(Composition.)

This valve is made of our standard high grade composition metal, finely finished, and is adapted for the same service to which the No. 22 style valve is applied, only on a smaller scale. It is automatic in relief, and equipped with hand wheel for easy adjustment, being also fitted with spring of Jessop's steel.

DIRECTIONS.

To change pressure, turn wheel down for more and *vice versa* for less pressure.

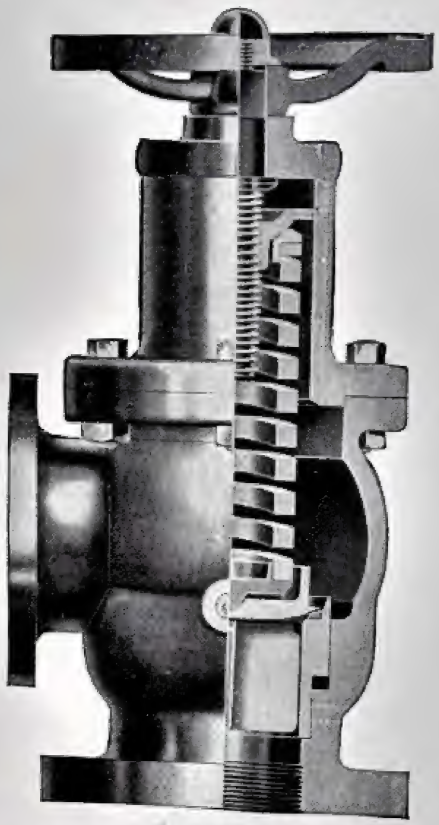
PRICE LIST.

Size Valve .	⅛ in.	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
Price	$5.00	$5.00	$5.50	$5.50	$7.00	$9.00	$12.50	$16.50	$23.00	$40.00	$65.00

Write for Discounts.

The Ashton Water Relief Valve.

No. 22



For Fire Pumps, Hydraulic Elevators, Water Works, Pumping Stations, and Stand Pipes, and wherever an automatic relief valve is wanted to prevent a water hammer or over-pressure of water. These valves are largely used in mills in connection with the fire pump, and will positively prevent bursting of hose or pipe.

Greatest efficiency and durability, combined with ease of adjustment, are the main points that have brought this valve into such extensive use.

As shown in the sectional *interior* view, this valve is made of a large pattern, with extra long spring, giving large relief. It is furnished with large wheel-top for easy adjustment. The working parts are of high grade composition metal to prevent corrosion; the spring, of Jessop's steel.

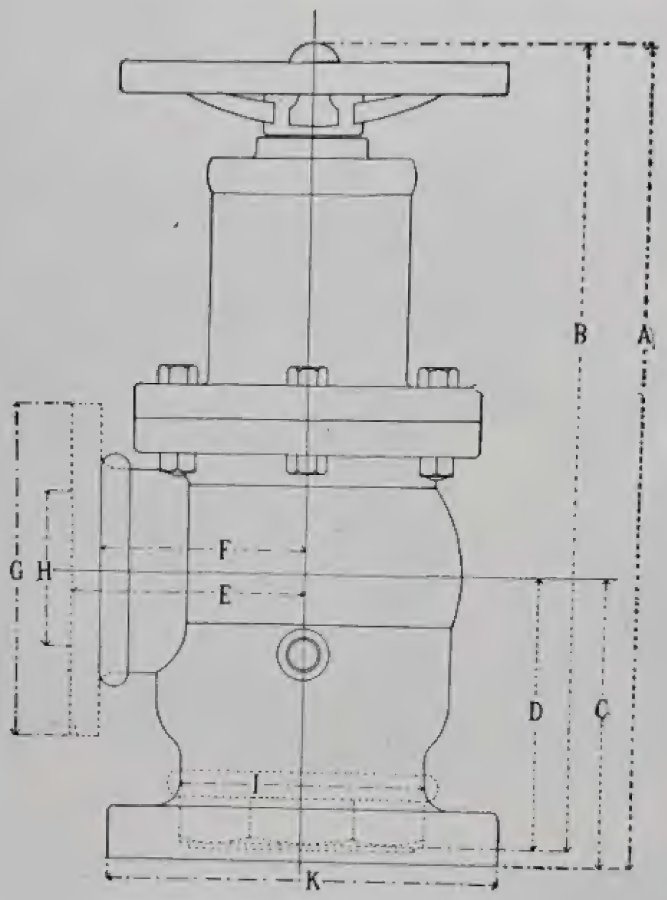
DIRECTIONS.

To change and *increase* relief pressure, turn wheel on top of valve from right to left. To set at *lower* pressure, turn from left to right. It will be observed these regulations are the reverse way to which our "Pop" Valves are changed.

PRICE LIST.

Size Valve	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	5½ in.	6 in.
Price	$30	$40	$60	$75	$80	$85	$105	$125	$140	$150
Diameter Inlet Flange	...	...	8 in.	9 in.	10 in.	10 in.	12 in.	12 in.	14 in.	14 in.

Dimension Sheet of No. 22 Ashton Valve.



No. 22.

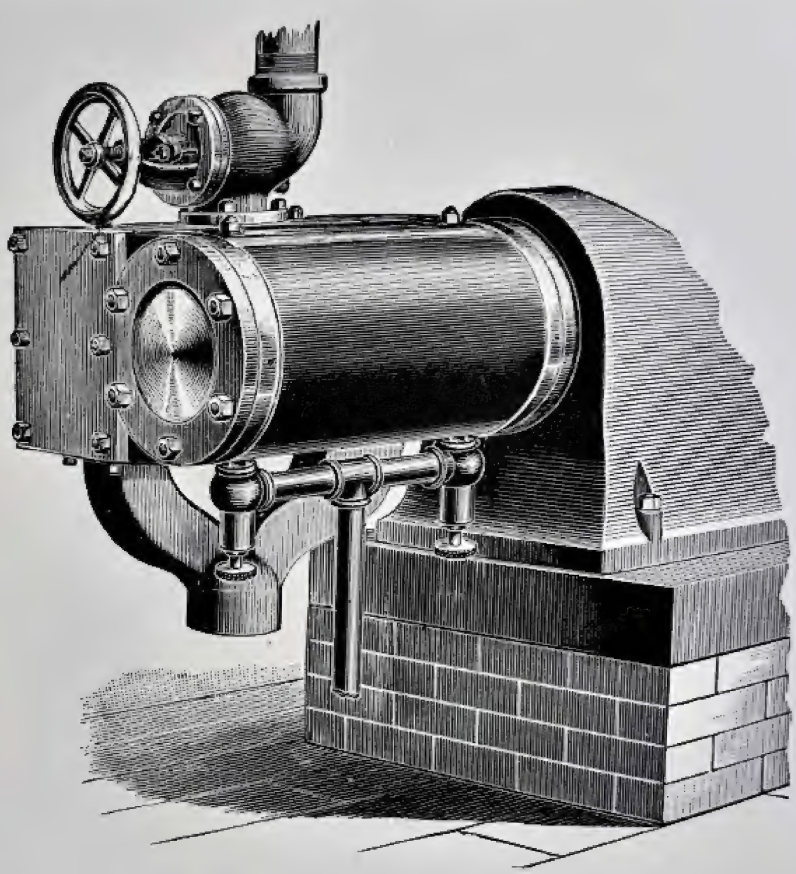
DIMENSIONS IN INCHES.

Sizes.	A	B	C	D	E	F	G	H	I	K
1½	12	12	4¼	4¼	3½	2½	5	1½	3⅛	6
2	14⅛	14⅜	4⅞	5⅛	3⅝	3⅜	5½	2	4½	7
2½	17½	17¼	6¼	6	4¾	4⅛	7	2½	4⅜	8
3	19½	19½	6¾	6¾	5¼	4½	7½	3	5⅛	9
3½	19¾	19¾	7¾	7¾	5¾	5¼	8	3½	5¼	10
4	21¼	21	7⅜	7⅛	6	5¼	8½	4	6¼	10
4½	20	20¼	7⅝	7⅞	6¼	5⅝	9	4½	6¾	12
5	20¾	21	8¼	8½	6⅝	6	9½	5	7¼	12
5½	22⅞	22⅝	8¾	8½	7	6½	10	*5½	8⅛	14
6	24¼	24½	9	9¼	7¼	6¾	10½	6	9	14

* When screw outlet is used it is cut from 5-inch pipe

The Ashton Cylinder Relief Valve.

No. 10.



With an Ashton Cylinder Relief Valve of sufficient size applied to each end of a steam-engine cylinder, perfect safety is assured. No danger of blowing cylinder heads out or doing other damage by the accumulation of water in the cylinder. This valve is provided with wheel top, so that the set pressure can readily be changed as desired. When specially requested, these valves are made with side connection on bottom part for indicator attachment.

In ordering state highest pressure, the usual custom being to set the valves to relieve at from 10 to 15 pounds higher than highest working pressure.

This valve made of composition metal, finely finished throughout, with Jessop's steel springs.

PRICE LIST.

Size Valve.	⅛ in.	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
Price	$5.00	$5.00	$5.50	$5.50	$7.00	$9.00	$12.50	$16.50	$23.00	$40.00

Write for Discounts.

The Ashton Snifting Relief Valve.

No. 18.
(Composition.)

This Snifting Valve is used on cylinders, condensers, or in any place where a quick-working relief valve is needed. It is made of composition metal with pipe outlet, and similar in construction to the No. 24 Valve shown on page 33.

As shown in the above cut, this valve is quite commonly made with extra side-pipe connection on bottom part for indicator attachment. This is not furnished, however, unless specified on the order.

Always give highest working pressure when ordering.

PRICE LIST.

Size Valve	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
Price	$5.50	$7.00	$9.00	$12.50	$16.50	$23.00	$40.00

Write for Discounts.

The Ashton Improved Ammonia Relief Valve.

No. 23.

This valve is solidly constructed, with the body and head of cast steel, with long spring of Jessop's Sheffield steel, capable of giving large and free relief. Good for pressure up to 500 pounds per square inch. It is designed to keep tight in continued service and to give prompt and efficient relief.

Made with either screwed or flanged connections, also with lock up attachment when specially ordered.

PRICE LIST.

Size	¼ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3
Price	$10	$12	$14	$22	$25	$30	$40	$60	$75

Write for Discounts.

The Ashton Hydraulic Relief Valve.

FOR EXTREME HIGH-PRESSURE SERVICE.

No. 25 A.

Extra Heavy Pattern Steel Body.

No. 25.

Light Pattern Composition Body.

Our Hydraulic Valves are made to suit any pressure, and are extensively used on hydraulic presses and pumps, or wherever an automatic high pressure relief is required. They are solidly constructed, of material of great tensile strength, and so made that they can be taken apart to grind in the seat or otherwise clean the valve part, without breaking the inlet or outlet connection.

They are made in all sizes, usually of our high grade composition metal, with the springs of Jessop's steel.

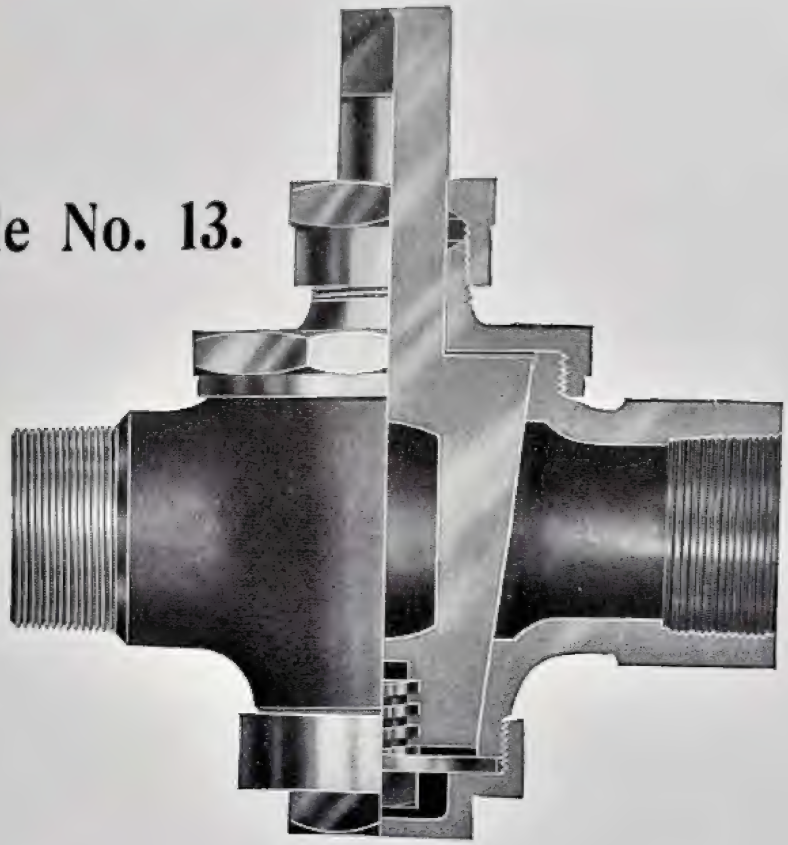
In ordering the size valve and highest working pressure should always be stated, and whether flanged or screwed connections.

Prices on Application.

The Ashton Improved Blow-Off Valve

Miller Patent

Style No. 13.



Specially designed for long service and ease of operation, embodying simplicity of construction and effective means of adjustment for taking up the wear on the plug. Made with composition body.

The above cut shows our improved style of plug cock in its closed position. The novel and valuable feature in it is the screw adjustment at the bottom, whereby in opening the cock the plug is raised slightly from its seat, which allows it to turn free in the case. In closing, the plug is drawn down to its seat, thus avoiding the friction and sticking so common in the old style plug cock.

To adjust the cock after grinding, place the plug in its closed position, as shown, then turn screw at bottom up tight, and afterwards screw on the outside bottom cap, so that it will hold the screw firmly in its position.

PRICE LIST.

Size Valve ..	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
Price	$24.00	$28.00	$30.00	$38.00	$48.00

Write for Discounts.

The Ashton Locomotive Pop Safety Valves.

With an enviable record covering more than forty years, Ashton Pop Safety Valves are well known not only to the railroads of America, but to those of many foreign countries. Their important features of design, as described below and on the immediate following pages, are those which have proved to be most successful in both locomotive and stationary service, and therefore may in no wise be considered experimental.

One of the most essential features in safety valve construction is the means provided for pop regulation. In Ashton valves the pop, or blow-back, is controlled by patented regulators, which extend through the top and outside of the valve body, whereby they are always readily accessible. This regulation requires no special wrenches and does not make use of so-called "adjustable rings," or sleeves, which usually become inoperative from binding or corrosion. There is also no outside casing to move for pop adjustment that may be damaged by wrenches.

The Ashton patented knife edge lip wing valve is an exclusive form of construction, which insures the most steady and invariable pop. The knife edge lip wears down proportionately to the valve seat, thus maintaining the outlet of the main pop chamber in the same relative proportion to the inlet. This obviates the necessity of frequent adjustment to prevent excessive pop as commonly experienced with valves having overhanging lips or projecting rings.

Our springs of Jessop's best steel are carefully made and tested in our own factory and guaranteed for at least five years' service, when used at the pressures for which they are designed.

Every part of Ashton valves that is subjected to special wear is re-enforced and of heavy construction, and being made of high-grade composition metal insures greatest durability and lowest cost of maintenance.

Ashton valves are positively guaranteed to be free from any defects in material or workmanship; to fully relieve the boilers to which they are applied; to require less attention; operate closer; with less pop reduction; of heavier construction; and to stay out of the shops longer than any other safety valves of which we have knowledge.

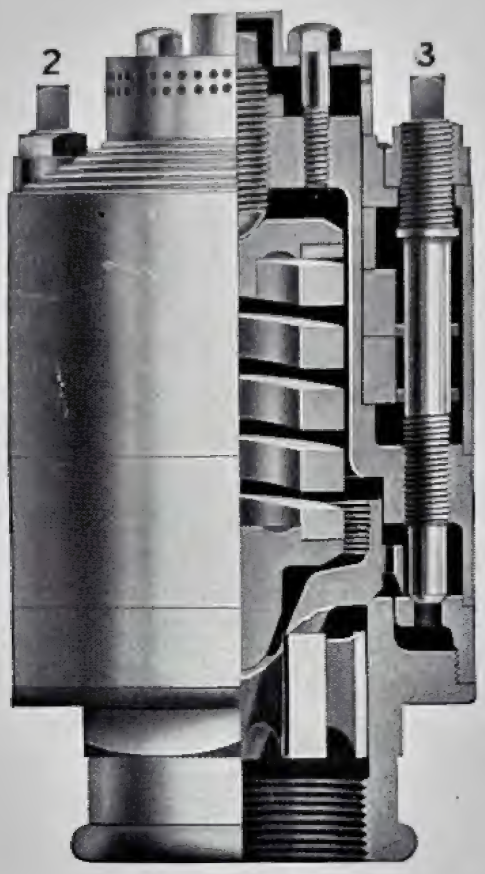
We will furnish trial sets of any of our various styles of locomotive valves for examination and test, subject to approval only if entirely satisfactory after actual service test. We also supply to those interested in our product a form showing the number and size of valves we recommend for locomotive boilers of various sizes and pressures.

Ashton patents control the only practical method of regulating the pop without taking the valve apart or removing it from the locomotive.

The Ashton Locomotive Muffled Pop Safety Valve.

(Patented.)

No. 30



The Ashton No. 30 Style Muffled Valve has proven its value and durability by the test of time, covering a period of over thirty years, and is to-day the greatest in demand. It gives efficient and quiet relief in contrast with that of the noisier open pop style valves, and for that reason has been largely adopted by railroads as the working valve on their locomotives.

This valve is made with solid base and heavy working parts of high grade composition metal, with spring of Jessop's steel. It embodies the typical and exclusive Ashton feature of top outside pop regulation, giving the most reliable, practical, and efficient method of controlling the blow-back without taking the valve apart, or removing it from the locomotive. This style valve is so constructed as to operate with moderate lift, giving easy relief, thus insuring greatest durability and lowest cost of maintenance.

The inlet connections on these valves are regularly made with standard pipe thread one half size smaller than the size of the valve, but will be made without extra charge with special threads to fit any size dome connections, thus enabling railroads to keep their present standard, when so desired.

Directions for changing pop or set pressure adjustment are same as shown on opposite page.

DIMENSIONS.

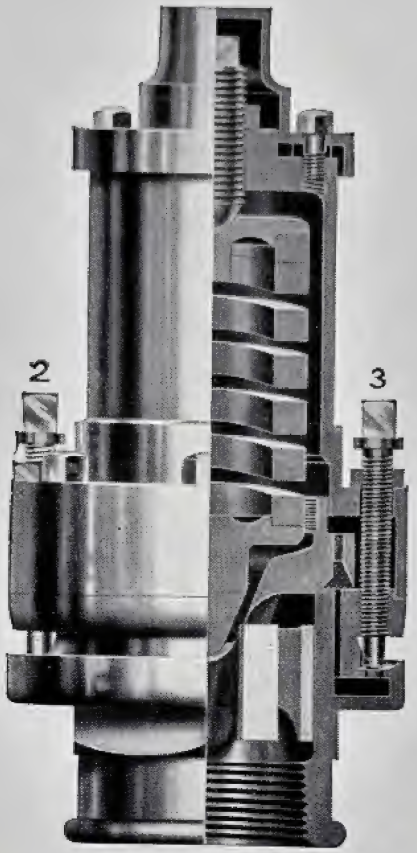
Size Valve	2½ in.	3 in.	3½ in.	4 in.
Total Height	9¾ in.	10⅝ in.	11½ in.	12½ in.
Outside Diam.	5½ in.	6 in.	6½ in.	7⅝ in.

We are prepared to furnish valves of smaller diameter and height if desired.

Prices on Application.

The Ashton Locomotive Open Pop Safety Valve

(Patented.)



No. 28

The Ashton No. 28 Style Open Pop Valve stands without a peer not only in excellence of design, but also as to efficiency in operation and durability. No other open pop valve holds such an enviable record for long and satisfactory service. It embodies the same meritorious features that are typical of Ashton valves, including top outside pop regulation, wing valve with knife edge lip, Jessop's steel spring, besides downward discharge outlet, preventing cinders from entering the valve body and clogging the working parts.

This valve operates with moderate lift similar to our No. 30 Muffled Valve, and also is made with the same standard inlet connection mentioned on opposite page.

DIRECTIONS.

TO CHANGE "POP," or blow-back, slacken check-nut on either one or both of the top regulators (No. 2 and 3), and screw down for increased "pop," or contrary for less "pop."

TO CHANGE SET PRESSURE, first unbolt and remove top cap, thus exposing the pressure screw; then slacken check-nut and turn pressure screw down for increased, or up for less pressure, after which set up check-nut. When a change of more than fifteen pounds in set pressure is desired, new springs suitable for such pressure should be ordered to obtain greatest efficiency.

DIMENSIONS.

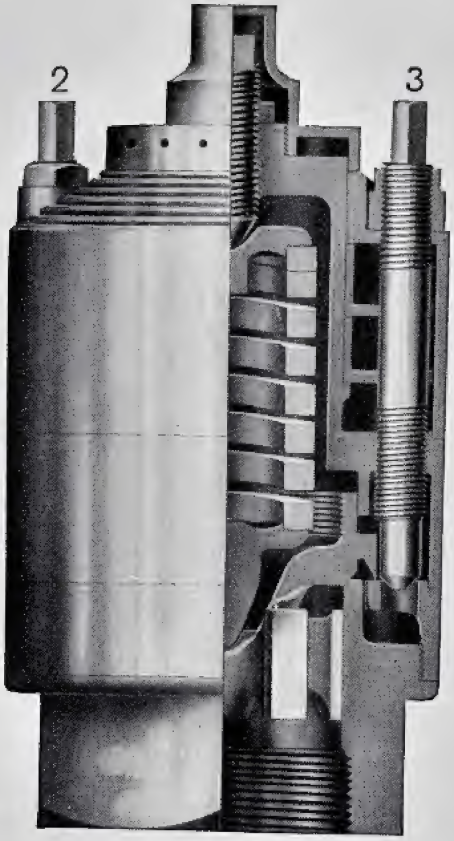
Size Valve	2½ in.	3 in.	3½ in.	4 in.
Total Height	10⅝ in.	11½ in.	11½ in.	13⅝ in.
Outside Diam.	5 in.	5½ in.	6¾ in.	7⅝ in.

We are prepared to furnish valves of smaller diameter and height if desired.

Prices on Application.

The Ashton
Master Mechanics Standard
Locomotive Muffled Safety Valve.

No. 30 M.M.



The Ashton No. 30 M. M. Style Muffled Valve illustrated above is constructed strictly in accordance with the recommended practice of the Committee on Safety Valves of the American Railway Master Mechanics' Association of 1912. The hexagon base is made to standard wrench size; the inlet connection is standard pipe thread of the same size as the valve; the valve lift is .10 and so stamped on the outside of the valve body; and the valve seat is made at an angle of 45 degrees.

In designing this valve the construction of the No. 30 Style Muffled Valve has been closely followed, whereby all the essential features of the latter have been incorporated. This includes the Ashton top outside pop regulation, knife edge lip wing valve, and Jessop's steel spring. The several interior working parts, which correspond to those in the No. 28 M. M. Open Pop Valve shown on opposite page, are made interchangeable in the several sizes, thus reducing the number of spare parts required to be carried in the store department.

We will furnish upon application a schedule form showing the number and size valve of this style that we recommend for locomotive boilers of various sizes and pressures. We will also willingly furnish a trial set of valves of the size recommended and guarantee them to fully relieve the boiler, require less attention, and show greater durability than any other similar valves on the market.

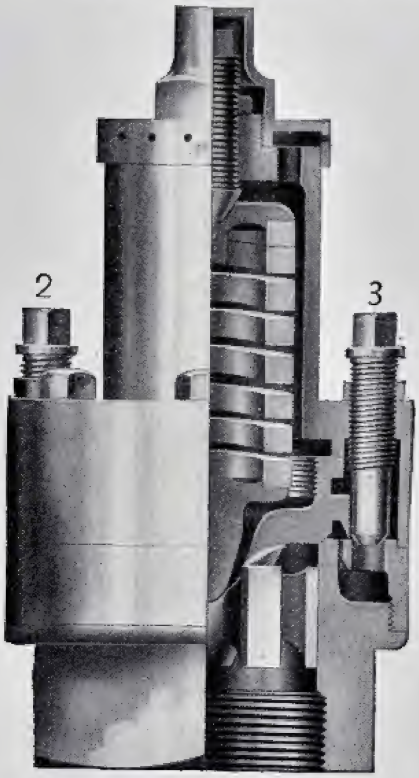
For directions in setting valves and regulating the "pop" see opposite page.

DIMENSIONS.

Size Valve	2½ in.	3 in.	3½ in.	4 in.
Total Height	10⅞ in.	12 in.	12¼ in.	13 in.
Outside Diam.	5½ in.	6 in.	6⅝ in.	7⅝ in.

Prices on Application.

The Ashton Master Mechanics Standard Locomotive Open Pop Safety Valve.



No. 28 M. M.

The Ashton No. 28 M. M. Style Open Pop Valve fully complies with the recommended practice of the Committee on Safety Valves of the American Railway Master Mechanics' Association of 1912, the principal features of which are mentioned in detail on the opposite page.

This valve is made with the Ashton top outside pop regulation, the dependable knife edge lip wing valve, and the reliable Jessop's steel spring. All working parts, excepting the spring, are of high grade composition metal and of heavy construction. All corresponding parts are interchangeable with those in the No. 30 M. M. Muffled Valve. The inlet connection is made with standard pipe thread of the same size as the valve, and the outlet is constructed with upward discharge.

DIRECTIONS.

TO CHANGE "POP," or blow-back, slacken check-nut on either one or both of the top regulators (No. 2 and 3), and screw down for increased "pop," or contrary for less "pop."

TO CHANGE SET PRESSURE, first unbolt and remove top cap, thus exposing the pressure screw; then slacken check-nut and turn pressure screw down for increased, or up for less pressure, after which set up check-nut. When a change of more than fifteen pounds in set pressure is desired, new springs suitable for such pressure should be ordered to obtain greatest efficiency.

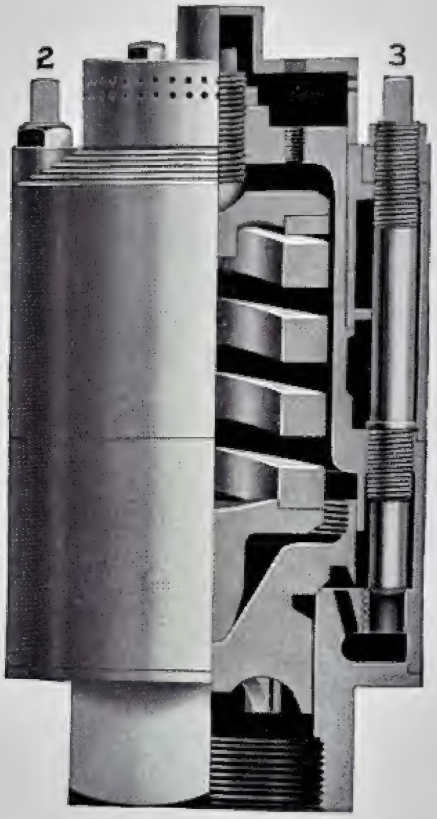
DIMENSIONS.

Size Valve	2½ in.	3 in.	3½ in.	4 in.
Total Height	10⅞ in.	12 in.	12¼ in.	13 in.
Outside Diam.	5½ in.	6 in.	6⅝ in.	7⅝ in.

Prices on Application.

The Ashton Locomotive Increased Lift Muffled Pop Safety Valve.

No. 30 I. L.



The Ashton No. 30 I. L. Style Muffled Valve is a variation in design from our other style of locomotive muffled valves, which was introduced upon the market several years ago with the advent of the larger type of locomotives. It satisfactorily meets a condition confronting the mechanical departments of many railroads where on large locomotive boilers there is an objection to the increase in size or number of moderate lift safety valves.

In the design and construction of this valve due consideration has been given to the exacting conditions of the increased capacity service. This has required a liberal distribution of metal, as well as a change in the proportion of the spring and wing valve, but otherwise the general design of the Ashton muffled valve has been closely followed, producing a result unequalled by any other valve of its kind on the market. It has a record for capacity second to none, and has proved by comparison with other makes to run longer without adjustment or repairs, showing lowest cost of maintenance.

The inlet connections on these valves are regularly made with standard pipe thread of the same size as the valve, but will be made, without extra charge, with special threads to fit any size dome connection. Working parts interchange with those of No. 28 I. L. Open Pop Valve.

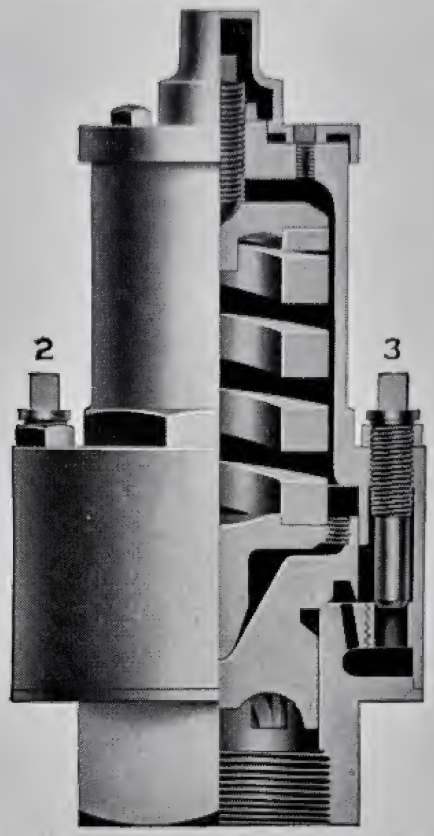
For directions in setting valves and regulating the pop see opposite page.

DIMENSIONS.

Size Valve	2½ in.	3 in.	3½ in.	4 in.
Total Height	11½ in.	12½ in.	13½ in.	14 in.
Outside Diam.	6 in.	6½ in.	7⅛ in.	8⅝ in.

Prices on Application.

The Ashton Locomotive Increased Lift Open Pop Safety Valve.



No. 28 I. L.

The Ashton No. 28 I. L. Style Open Pop Valve is made to similarly accomplish the same increased capacity of relief as the No. 30 I. L. Muffled Valve described on the preceding page. It gives equally satisfactory service, with the exception only that it does not have the same quiet relief afforded by the muffler. In consequence of this it is quite common practice to apply this valve in conjunction with the No 30 I. L. Muffled Valve, using the latter as the ordinary working valve.

This valve is solidly constructed to give greatest durability and embodies in design the typical features in Ashton valves of outside top pop regulation, knife edge lip wing valve, and Jessop's steel spring. The inlet connections are of the same size as those of the No. 30 I. L. Muffled Valves with which all working parts interchange.

We furnish upon application a schedule form showing the number and size valves of increased lift style that we recommend for locomotive boilers of various sizes and pressures. Trial sets of valves are also willingly furnished upon application.

DIRECTIONS.

TO CHANGE "POP," or blow-back, slacken check-nut on either one or both of the top regulators (No. 2 and 3), and screw down for increased "pop," or contrary for less "pop."

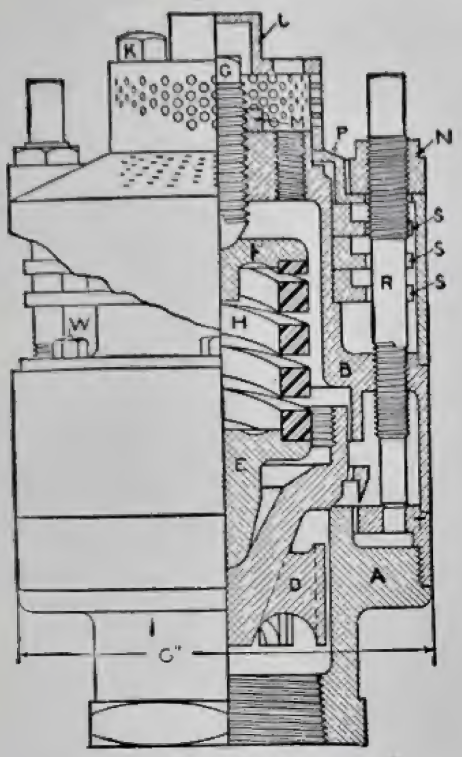
TO CHANGE SET PRESSURE, first unbolt and remove top cap, thus exposing the pressure screw; then slacken check-nut and turn pressure screw down for increased, or up for less pressure, after which set up check-nut. When a change of more than fifteen pounds in set pressure is desired, new springs suitable for such pressure should be ordered to obtain greatest efficiency.

DIMENSIONS.

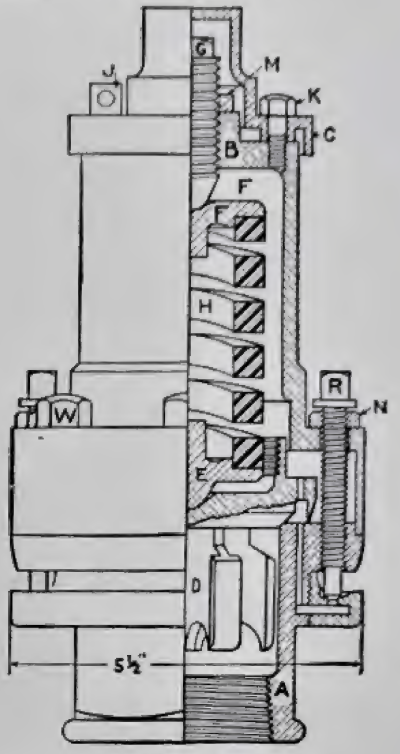
Size Valve	2½ in.	3 in.	3½ in.	4 in.
Total Height	12 in.	12⅞ in.	13⅝ in.	14 in.
Outside Diam.	6 in.	6½ in.	7⅛ in.	8⅝ in.

Prices on Application.

The Ashton Improved Locomotive Pop Safety Valves.



Muffler.



Open Pop.

PRICE LIST OF PARTS.

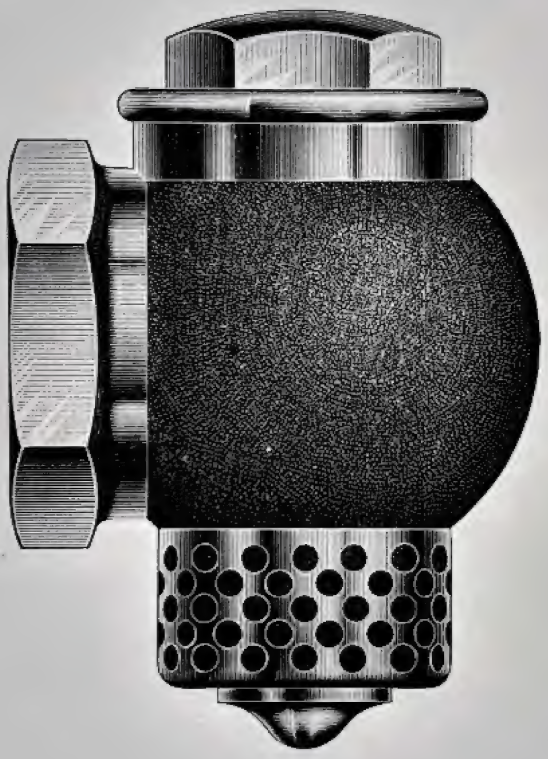
Name of Part	Letter	Muffler, 2½ in.	Open Pop, 2½ in.	Muffler, 3 in.	Open Pop, 3 in.	Muffler, 3½ in.	Open Pop, 3½ in.	Muffler, 4 in.	Open Pop, 4 in.
Bottom	A	$18.00	$14.00	$20.00	$16.00	$21.00	$17.00	$25.00	$20.00
Head	B	16.00	12.00	18.00	14.00	19.00	15.00	22.00	18.00
Cap.....	C	*4.00	2.50	*4.50	3.00	*5.00	3.50	*6.00	4.00
Wing Valve	D	7.00	7.00	7.50	7.50	8.00	8.00	9.00	9.00
Lower Disc	E	.50	.50	.50	.50	.50	.50	.50	.50
Upper Disc	F	.50	.50	.50	.50	.50	.50	.50	.50
Pressure Screw	G	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spring	H	6.00	6.00	7.00	7.00	8.00	8.00	9.00	9.00
Lock Staple....	J		.50		.50		.50		.50
Cap Bolt.....	K	.20	.20	.20	.20	.20	.20	.20	.20
Body Screw	L	.10	.10	.10	.10	.10	.10	.10	.10
Pressure Screw Check Nut.	M	.20	.20	.20	.20	.20	.20	20	.20
Regulator Check Nut.....	N	.50	.20	.50	.20	.50	.20	.50	.20
Casing Lock Collar	O			.90		1.00			
Dome Top	P	13.00		14.00		16.00		19.00	
Pop Regulator .	R	5.50	2.00	*6.00	2.50	*6.50	3.00	7.50	3.75
Muffler Plate.	S	1.50		1.80		2.00		2.25	
Base Ring.....	T	FURNISHED ONLY AS PART OF BOTTOM PART A							
Head Bolt	W	.20	.20	.30	.20	.40	.30	.40	.40

*Part "C" of No. 30 M. M. valves is same as that in the Open Pop and takes same price list as the latter. Part "R" of the No. 30 B valves similarly takes same price as the Open Pop Style.

Subject to Discount.

In ordering parts always specify letter, name of part, and designate style and size valve.

The Ashton Locomotive Steam Chest Vacuum Valve.



No. 35.

This valve, as above shown, is largely used on the steam chests of locomotive cylinders. Its purpose is to prevent a vacuum forming in the cylinders when the locomotive is running after the steam has been shut off. It is also possible to adapt this valve to many other uses where it is desired to have a vacuum relief valve.

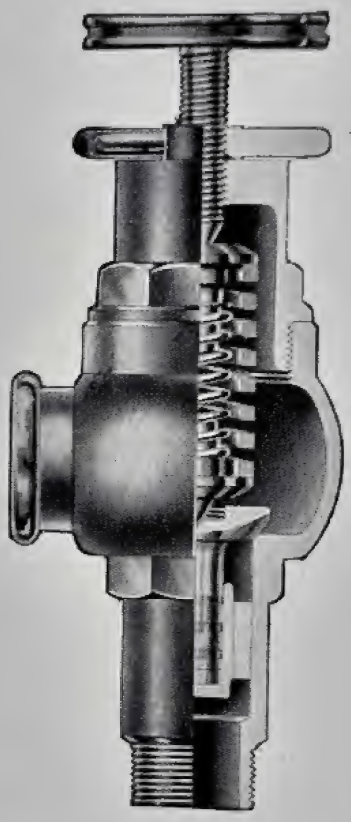
Prices on Application.

The Ashton Car Heating Relief Valve.

WITH ADJUSTABLE DOUBLE SPRING.

(Patented.)

No. 33.



Patented
Dec. 30, 1902.

The Ashton Double Spring Relief Valve, as shown in the above cut, is made with two springs one inside the other, the outer and larger spring being subjected to tension at all times while the smaller and inside spring is only under tension at higher pressures. With this double spring arrangement the valve has a long range of adjustment, and is as efficient at seventy pounds pressure as at five pounds, which are the extremes at which it is usually desired to have the valve operate. This is a particularly meritorious feature, as a single spring valve is not practical for these extremes. Our Relief Valve is also made with the joint above the valve outlet, whereby the interior parts are always easily accessible for cleaning or otherwise, without disturbing the outlet pipe, which is a feature of much advantage. It is made with a suitable size wheel for hand adjustment, and is fitted with cross-bar check nut.

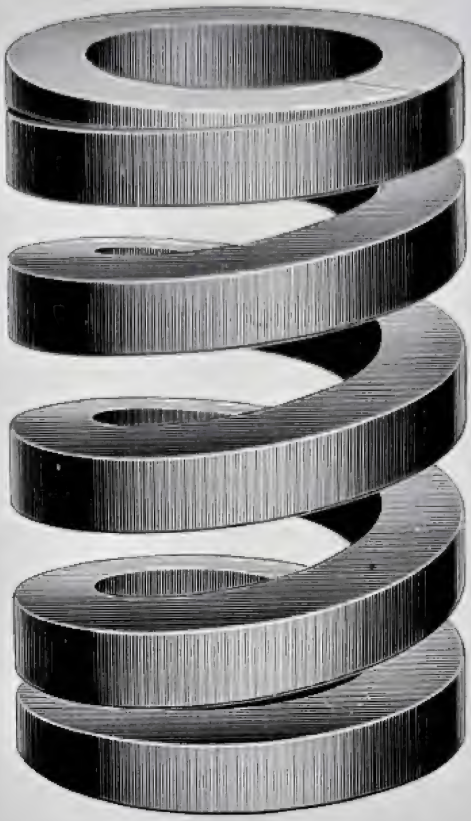
We make this valve of our standard high grade composition metal throughout, with the exception of the spring, which is of Jessop steel.

This valve is at present the standard on the Economy Car Heating Company's system of car heating.

Prices on Application.

The Ashton Pop Safety Valve Springs.

All the springs used in the Ashton Pop Safety Valves are manufactured by hand at our own works of the highest quality of cast steel; Jessop's steel, as imported from Sheffield, England, being used exclusively.



Each spring is made and tempered separately, so that every part comes directly under the eyes of the workmen. They are ground square and true on the ends, and afterwards tested to stand at least double the strain that they will ever be put to in actual service.

The life of a Pop Safety Valve is in its spring.

Price List of Springs, for Various Size and Style Ashton Valves.

Size of Valve Inches	No. 3 Style Valve	No. 5 Style Valve	No. 16 Duplex Style Valve	No. 16 A Duplex Style Valve	No. 17 Style Valve	No. 20 Duplex Style Valve	No. 20 A Duplex Style Valve	No. 22 Style Valve	Nos. 6 7, 8, 9 14, 15 Style Valves	Nos. 10 18, 23 24 Style Valves	Nos. 31, 32 Style Valves	No. 33 Style Valve	Nos. 28 28 M.M. 28 I.L. 30 30 M.M. 30 I.L. Style Valves
1/8	....	....	....	....	....	....	....	....	....	....	$0.50	....	....
1/4	....	....	....	....	....	....	....	....	....	....	.60	....	....
3/8	....	....	....	....	....	....	....	....	....	$0.75	.75	....	....
1/2	....	....	....	....	....	....	....	....	$0.75	.75	1.00	....	....
3/4	....	....	....	....	....	....	....	....	1.00	1.00	1.50	....	....
1	....	....	....	....	....	....	....	....	1.50	1.50	....	....	....
1 1/4	....	....	....	....	....	....	....	....	1.50	1.50	....	$3.00	....
1 1/2	....	....	....	....	....	....	....	....	2.00	2.00	....	....	....
2	$3.00	$4.00	$4.50	$5.00	$4.00	$4.00	$4.00	$5.00	2.50	2.50	....	....	....
2 1/2	3.50	4.75	5.50	7.00	5.00	5.00	5.00	7.00	3.00	3.00	....	....	$6.00
3	4.00	5.50	7.00	10.00	6.00	6.50	6.00	8.00	3.50	3.50	....	....	7.00
3 1/2	4.50	6.50	9.00	13.00	8.00	8.00	8.00	9.00	....	....	....	....	8.00
4	5.50	7.50	11.00	17.00	10.00	10.00	10.00	12.00	....	....	....	....	9.00
4 1/2	6.50	9.00	15.00	22.00	13.00	12.00	13.00	15.00	....	....	....	....	....
5	8.00	12.00	21.00	27.00	....	15.00	16.00	19.00	....	....	....	....	....
5 1/2	9.50	15.00	28.00	33.00	....	20.00	25.00	23.00	....	....	....	....	....
6	11.00	18.00	36.00	41.00	....	25.00	35.00	27.00	....	....	....	....	....

Subject to Discount.

SPECIAL SPRINGS.

We manufacture for special purposes springs of various styles, far superior to the cheap grades, which are carelessly tempered in large quantities and made of inferior stock. All our springs are guaranteed free from defects in material and workmanship. Prices on application.

Useful Information Regarding the Application, Care, and Maintenance of the Ashton Pop Safety Valves.

The careful consideration of the following suggestions will insure satisfactory service and greatest efficiency and durability.

Ashton Pop Safety Valves must always be applied close to the boiler by a short nipple or flange connection. Being sensitive in action, and having large efficiency, they require close application to the main body of steam, otherwise they will not get sufficient supply to keep them well off their seats when blowing, to prevent chattering to their injury.

In making up joints between valves and connections, red lead or other similar material used should be put on sparingly, and gaskets on flanges should be carefully trimmed to prevent any foreign material to work up into the valves to clog them or make them leak.

Figure 1, on opposite page, shows in outline a portion of the wing valve part of an Ashton valve. *A* represents the knife edge pop lip, and *E* the supplementary relief holes in the top of the pop chamber.

Fig. 2 shows a portion of the bushing or valve seat to which the wing valve is nicely fitted. *C* is the bevel seat as made on the bushing *B*.

Fig. 3 shows the wing valve in normal position on its seat, *D* being the enclosed pop chamber thus formed.

With this construction it is obvious that the wing valve must rest solidly on the ground joint at the bevel seat, therefore the knife edge lip must never touch on the bushing, otherwise the valve will leak. It is customary to carefully fit the valve when new, so that the lip will have a space below it that will permit of a thin sheet of paper being passed between it and the bushing, or so that the valves can be slightly rocked by hand. This relation of valve to bushing must be considered in making repairs.

The depth of the pop chamber should be kept approximately to the original dimensions when making repairs, and the bevel seat on bushing

will give the best results if maintained the same narrow width of not over one-eighth of an inch, even on the largest size valves.

The relief holes, *E*, modify the pop, or difference between the pressure at which the valve opens and that at which it closes, which is usually from three to five pounds. More holes make less pop, or *vice versa*. The pop is entirely dependent upon the amount of pressure that is accumulated in the pop chamber, the main discharge passing under the lip.

Pop Safety Valve springs must be of proper size to suit the pressure at which the valve is to work. They cannot be used for a greater range than fifteen pounds above or below the original set pressure without materially impairing the efficiency of the valve. Lighter or heavier springs are required to be fitted for other changes of working pressures desired.

FIG.1

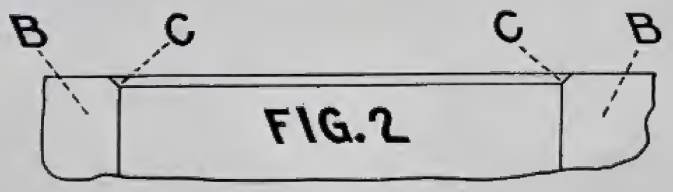


FIG.2

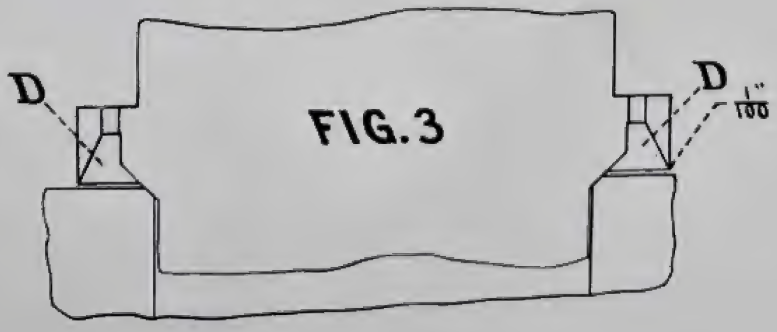


FIG.3

Areas of Circles.

Areas of Circles from which can be computed the proper size of Ashton Pop Safety Valves, in accordance with Rules.

To ascertain the proper size of Pop Safety Valves for boilers, first, find the area of grate surface in square feet; then apply the established rules of proportion of valve area to the grate area, and refer to table, which will give the necessary diameter of valve.

Diam., inches.	Area, square inches.	Diam., inches.	Area, square inches.	Diam., inches.	Area, square inches.	Diam., inches.	Area, square inches.
1/64	.000192	4	12.5664	1/8	65.3968	1/4	159.485
1/32	.000767	1/8	13 3641	1/4	67.2008	3/8	162.296
1/16	.003068	1/4	14.1863	3/8	69.0293	1/2	165.13
1/8	.012272	3/8	15.033	1/2	70.8823	5/8	167.99
3/16	.027612	1/2	15.9043	5/8	72.7599	3/4	170.874
1/4	.049087	5/8	16.8002	3/4	74.6621	7/8	173.782
5/16	.076699	3/4	17.7206	7/8	76.5888	15	176.715
3/8	.110447	7/8	18.6655	10	78.54	1/8	179.673
7/16	.15033	5	19.635	1/8	80.5158	1/4	182.655
1/2	.19635	1/8	20.629	1/4	82.5161	3/8	185.661
9/16	.248505	1/4	21.6476	3/8	84.5409	1/2	188.692
5/8	.306796	3/8	22.6907	1/2	86.5903	5/8	191.748
11/16	.371224	1/2	23.7583	5/8	88.6643	3/4	194.828
3/4	.441787	5/8	24.8505	3/4	90.7628	7/8	197.933
13/16	.518487	3/4	25.9673	7/8	92.8858	16	201.062
7/8	.601322	7/8	27.1086	11	95 0334	1/8	204.216
15/16	.690292	6	28.2744	1/8	97.2055	1/4	207.395
1	.7854	1/8	29.4648	1/4	99.4022	3/8	210.598
1/8	.99402	1/4	30.6797	3/8	101.6234	1/2	213.825
1/4	1.2272	3/8	31.9191	1/2	103 8691	5/8	217.077
3/8	1.4849	1/2	33.1831	5/8	106.1394	3/4	220.354
1/2	1.7671	5/8	34.4717	3/4	108.4343	7/8	223.655
5/8	2.0739	3/4	35.7848	7/8	110.7537	17	226.981
3/4	2.4053	7/8	37.1224	12	113.098	1/8	230.331
7/8	2.7612	7	38.4846	1/8	115.466	1/4	233.706
2	3.1416	1/8	39.8713	1/4	117.859	3/8	237.105
1/8	3.5466	1/4	41.2826	3/8	120.277	1/2	240 529
1/4	3.9761	3/8	42.7184	1/2	122 719	5/8	243.977
3/8	4.4301	1/2	44.1787	5/8	125.185	3/4	247.45
1/2	4.9087	5/8	45.6636	3/4	127.677	7/8	250.948
5/8	5.4119	3/4	47.1731	7/8	130.192	1	254.47
3/4	5.9396	7/8	48.7071	13	132.733	1/8	258.016
7/8	6.4918	8	50.2656	1/8	135.297	1/4	261 587
3	7.0686	1/8	51.8487	1/4	137.887	3/8	265.183
1/8	7.6699	1/4	53.4563	3/8	140.501	1/2	268.803
1/4	8.2958	3/8	55.0884	1/2	143.139	5/8	272.448
3/8	8.9462	1/2	56.7451	5/8	145.802	3/4	276.117
1/2	9.6211	5/8	58.4264	3/4	148.49	7/8	279 811
5/8	10.3206	3/4	60.1322	7/8	151.202	19	283.529
3/4	11.0447	7/8	61.8625	14	153.938	1/8	287.272
7/8	11.7933	9	63.6174	1/8	156.7	1/4	291.04

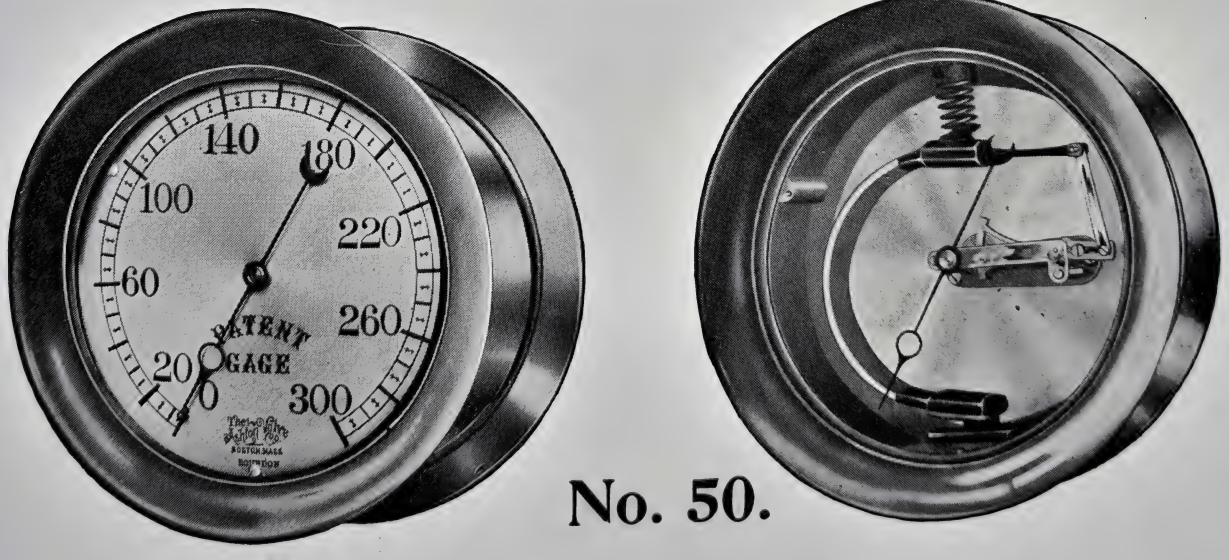
The Ashton Improved Pressure and Vacuum Gages.

GENERAL DESCRIPTION.

Ashton gages are carefully and conscientiously made, and the product of the best of material and skilled labor combined. Their reputation is second to none, and we warrant them to be superior in quality, durability, and accuracy. They are made with solid drawn-brass seamless tubes. The movements are of solid construction, and non-corrosive, having German silver pinions and arbors. Every dial is marked up separately and accurately to exactly match the mechanism of the gage on which it is used, and the letters and figures are indented so they can be easily read, and will not wear off. The springs are well seasoned to prevent setting. When desired, name is marked on dials at no extra expense. A siphon must invariably be used on all steam gages, so that nothing but water will enter the gage

The Ashton Patent Steam Gage.

WITH AUXILIARY SPRING.



No. 50.

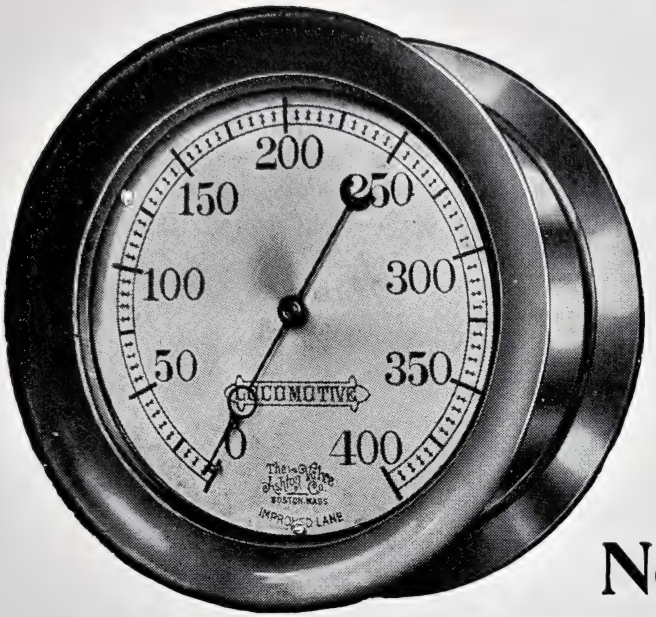
The above gage is for special conditions, where our regular No. 51 and 52 styles are not adapted, due to extreme high pressure or excessive vibration.

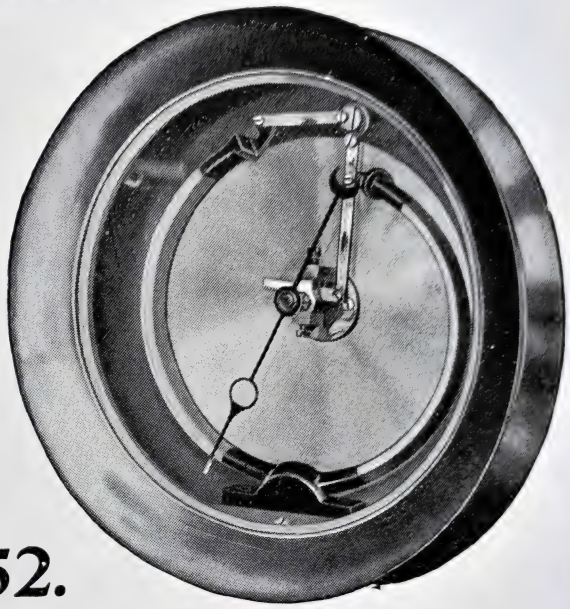
Non-setting. Non-freezing. Non-corrosive. Accurate and reliable.

Prices, Same as No. 52 Gage on Page 56.

The Ashton Improved Double Spring Bourdon Steam and Pressure Gages.

(LANE'S IMPROVEMENT.)





No. 52.

Springs of Solid Drawn Seamless Tube.

ADAPTED FOR LOCOMOTIVE AND MARINE SERVICE PORTABLE AND STEAM FIRE ENGINES.

This gage is made with the Lane Improvement of the double spring, and is much preferable to the ordinary single-spring gage. Many of the objectionable features of the Bourdon Gage are obviated in this gage, there being less vibration of the hand, and with the short springs prevents freezing up in case of exposure.

PRICES, INCLUDING COCK.

Size.	Iron Case, Japanned.	Iron Case, N.P. Ring.	Brass Case.	N.P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
24 inch Dial,	$230.00	$236.00	$280.00	$300.00		
20 " "	155.00	160.00	200.00	215.00		
18 " "	125.00	128.00	170.00	182.50		
16 " "	105 00	107.00	140.00	150.00		
14 " "	90.00	91.50	115.00	122.50		
12 " "	55.00	56.50	80.00	84.00	$85.00	$89.00
10 " "	37.00	38.00	45.00	48.00	49.00	52.00
8½ " "	25.00	25.75	34.00	36.50	37.50	40.00
6¾ " "	18.00	18.60	22.00	24.00	25.00	27.00
6 " "	15.00	15.50	18.00	19.50	20.75	22.25
5½ " "	12.00	12.25	14.00	15.25	16.25	17.50
5 " "	11.00	11.20	13.00	14.00	15.00	16.00
4½ " "	10.00	10.20	12.00	13.00	13.75	14.75

Write for Discounts.

A siphon must invariably be used

The Ashton Improved Double Spring Locomotive Steam Gage.

WITH VERTICAL READING ADJUSTABLE DIAL.

No. 66.

The Ashton Vertical Reading Dial Gage, as above shown, has been designed to meet a demand for a locomotive steam gage that by a simple dial adjustment will always show the highest working pressure of the locomotive at the top of the dial, and the gage hand always in a vertical position at maximum pressure, same as shown in cut. By the adoption of this gage the engineer knows at a glance what is the working pressure of the locomotive he is assigned to take charge of, and by simply noting the relative position of the gage hand, without regard to the dial graduations, can readily observe how close the pressure is being carried to the maximum.

PRICE LIST.

Size.	Brass Case.	Iron Case.
6¾ inch Dial	$22.00	$18.00
6 " "	18.00	15.00
5½ " "	14.00	12.00
5 " "	13.00	11.00
4½ " "	12.00	10.00

The Ashton Improved Single Spring Bourdon Steam and Pressure Gages.

ADAPTED FOR USE ON BOILERS, ENGINES, STEAM VEHICLES, PRESSURE TANKS, ETC.

No. 51.

Springs of Solid Drawn Tube.

PRICES, INCLUDING COCK.

Size.	Iron Case, Brass Ring.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
24 inch Dial,	$200.00	$206.00	$260.00	$280.00		
20 " "	135.00	140.00	190.00	205.00		
18 " "	110.00	113.00	155.00	167.50		
16 " "	90.00	92.00	125.00	135.00		
14 " "	75.00	76.50	100.00	107.50		
12 " "	50.00	51.50	75.00	79 00	$80.00	$84.00
10 " "	32.00	33.00	40.00	43.00	44.00	47.00
8½ " "	22.00	22.75	30.00	32.50	33.50	36.00
6¾ " "	16.00	16.60	20.00	22.00	23.00	25.00
6 " "	13.00	13.50	16.00	17.50	18.50	20.00
5½ " "	10.00	10.25	12.00	13.25	13.75	15.00
5 " "	8.00	8.20	11.00	12.00	12.50	13.50
4½ " "	8.00	8.20	10.00	11.00	11.50	12.50
3½ " "	7.00	7.18	9.00	9.75	10.25	11.00
3 " "	6.00	6.15	8.00	8.60	9.25	9 75
2½ " "	6.00	6.15	8.00	8 60	9.25	9.75
2 " "	6.00	6.15	8.00	8.60	9.25	9.75

Write for Discounts.

In ordering always state size wanted, whether brass or iron case, and maximum pressure.

These gages are made with non-corrosive movements.

An allowance of 10 cents each will be made for cocks if not wanted.

Special net prices on sizes below 5½ inches when ordered in quantities.

The Ashton Improved Vacuum Gages.

No. 53.

Springs of Solid Drawn Tube.

The Ashton Improved Vacuum Gages are graduated to accurately indicate vacuum in square inches of mercury.

PRICES, INCLUDING COCK.

Size.	Iron Case, Brass Ring	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
24 inch Dial,	$200.00	$206.00	$260.00	$280.00		
20 " "	135.00	140.00	190.00	205.00		
18 " "	110.00	113.00	155.00	167.50		
16 " "	90.00	92.00	125.00	135.00		
14 " "	75.00	76.50	100.00	107.50		
12 " "	50.00	51.50	75 00	79.00	$80.00	$84.00
10 " "	32.00	33.00	40.00	43.00	44.00	47.00
8½ " "	22.00	22.75	30.00	32 50	33.50	36.00
6¾ " "	16.00	16.60	20.00	22.00	23.00	25.00
6 " "	13.00	13.50	16.00	17.50	18.50	20.00
5½ " "	10.00	10.25	12.00	13.25	13.75	15.00
5 " "	8.00	8.20	11.00	12.00	12.50	13.50
4½ " "	8.00	8.20	10.00	11.00	11.50	12.50
3½ " "	7.00	7.18	9.00	9.75	10.25	11.00
3 " "	6.00	6.15	8.00	8.60	9.25	9.75
2½ " "	6.00	6.15	8.00	8.60	9.25	9.75
2 " "	6.00	6.15	8.00	8.60	9.25	9.75

Write for Discounts.

In ordering always state whether nickel plated, brass, or iron case is wanted.

The Ashton Compound Pressure and Vacuum Gages.

No. 54.

Springs of Solid Drawn Tube.

These gages for indicating either pressure or vacuum are graduated for pressure in pounds per square inch, and for vacuum in inches of mercury column, fifteen pounds pressure being equal to about thirty inches of vacuum. If a pressure exceeding fifteen pounds is required, it should be stated in ordering.

PRICES, INCLUDING COCK.

Size.	Iron Case, Japanned.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
12 inch Dial,	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
10 " "	40.00	41.00	50.00	53.00	54.00	57.00
8½ " "	30.00	30.75	40.00	42.50	43.50	46.00
6¾ " "	20.00	20.60	25.00	27.00	28.00	30.00
6 " "	16.00	16.50	20.00	21.50	23.00	24.50
5½ " "	14.00	14.25	16.00	17.25	18.50	19.75
5 " "	14.00	14.25	16.00	17.25	18.50	19.75
4½ " "	12.00	12.20	14.00	15.00	16.00	17.00
3½ " "	10.00	10.18	12.00	12.75	13.75	14.50

Write for Discounts.

Always use a siphon, so that nothing but water will enter the gage.

The Ashton Improved Hydraulic Gages.

No. 55.

Our Hydraulic Gages are made with special steel tubes for indicating high pressures above one thousand pounds, and are accurately and carefully tested.

When ordering state maximum pressure required, and if dial is to show pressure in tons on ram, give exact diameter of ram.

PRICE LIST.

Size.	Iron Case, Brass Ring.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.
12 inch Dial	$110.00	$111.50	$125.00	$129.00
10 " "	90.00	91.00	100.00	103.00
8½ " "	70.00	70.75	80.00	82.50
6¾ " "	50 00	50.60	60 00	62.00
6 " "	35.00	35.50	40.00	41.50
5 " "	30.00	30.50	35.00	36.00
4½ " "	25.00	25.50	30.00	31.00

Write for Discounts.

No extra charge for marking tons on ram on dials. For maximum hands add $5.00 to list price. Special prices on Bourdon Brass Tube Hydraulic Gages for pressure not over two thousand pounds.

LIST PRICES.

Style.	⅛ in.	¼ in.	⅜ in.	½ in.
Finished Composition Hydraulic Check Valves	$1.75	$2 00	$2.75	$3.75
Finished Composition Double Hydraulic Check Valves	2.25	2.50	3.25	4.25
Finished Composition Hydraulic Cocks	2.75	3.50	7.00	10.50

Write for Discounts.

The Ashton Combination Water Pressure Gages.

No. 56.

Springs of Solid Drawn Seamless Tube.

These gages, more especially adapted for water works, pumping stations, etc., are for indicating the pressure of water in pounds per square inch, and the corresponding height of water column.

PRICES, INCLUDING COCK.

Size.	Iron Case, Japanned.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
12 inch Dial,	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
10 " "	40.00	41.00	50.00	53.00	54.00	57.00
8½ " "	30.00	30.75	40.00	42.50	43.50	46.00
6¾ " "	20.00	20.60	25.00	27.00	28.00	30.00
6 " "	16.00	16.50	20.00	21.50	23.00	24.50
5½ " "	14.00	14.25	16.00	17.25	18.50	19.75
4½ or 5 "	12.00	12.20	14.00	15.00	16.00	17.00

Write for Discounts.

To raise a column of mercury 2.04 inches, or to raise a column of water 27.67 inches, requires one pound pressure.

Always state, in ordering, the maximum pressure to be carried, or the maximum height of water.

The Ashton Improved Ammonia Gages.

No. 57.

Our Ammonia Gages are made with all the interior parts of iron excepting the springs, which are of steel, to withstand ammonia or any other gas or acid which attacks the ordinary brass Bourdon spring.

When desired these gages are made to indicate both pressure and vacuum on the same dial, but ordinarily only show pressure.

PRICE LIST.

Size.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.
12 inch Dial	$79.50	$98.00	$102.00
10 " "	58.00	68.00	71.00
8½ " "	45.75	55.00	57.50
6¾ " "	40.60	45.00	47.00
6 " "	35.50	39.00	40.50
5½ " "	30.50	33.00	34.25
5 " "	30.50	33.00	34.25
4½ " "	25.50	27.00	28.00
3½ " "	25.50	27.00	28.00

Write for Discounts.

In ordering state whether a compound scale showing pressure and vacuum or pressure only is required.

The Ashton Pyrometer Steam Gages.

No. 58.

Springs of Solid Drawn Tube.

For indicating pressure of steam in pounds per square inch, and corresponding degrees of heat. The inner circle indicates pounds pressure per square inch, and the outer circle the corresponding degrees of heat.

PRICES, INCLUDING COCK.

Size.	Iron Case, Japanned.	Iron Case N. P. Ring.	Brass Case.	N. P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
12 inch Dial,	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
10 " "	40.00	41.00	50.00	53.00	54.00	57.00
8½ " "	30.00	30.75	40.00	42.50	43.50	46.00
6¾ " "	20.00	20.60	25.00	27.00	28.00	30.00
6 " "	16.00	16.50	20.00	21.50	23.00	24.50
5½ " "	14.00	14 25	16.00	17.25	18.50	19.50

Write for Discounts.

In ordering state maximum pressure or temperature required.
A siphon is indispensable with these gages.

The Ashton Improved Altitude Gages.

No. 60.

This gage is especially adapted for use on hot-water heaters, to indicate the height of water in the tank or reservoir. The black hand, being actuated by the pressure of the column of water, shows the variations in the height of water in the tank. The red or lazy hand, which is independent from the gage tube, is to be set by the user, when the gage is put up, to indicate the number of feet that the height of the water should be maintained in the tank.

PRICES, INCLUDING COCK.

Size.	Iron Case, Brass Ring.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.	Brass Deep Case, O. G. or Oct. Ring.	N. P. Deep Case, O. G. or Oct. Ring.
12 inch Dial ..	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
10 " " ..	40.00	41.00	50.00	53.00	54.00	57.00
8½ " " ..	30.00	30.75	40.00	42.50	43.50	46.00
6¾ " " ..	20.00	20.60	25.00	27.00	28.00	30.00
6 " " ..	16.00	16.50	20.00	21.50	23.00	24.50
5½ " " ..	14.00	14.25	16.00	17.25	18.50	19.75
4½ or 5 " ..	12.00	12.20	14.00	15.00	16.00	17.00

Write for Discounts.

The Ashton Standard Test Gages.

No. 59.

Springs Made of Solid Drawn Seamless Tube.

Our Standard Test Gages are made with the greatest of care and with the best material and workmanship possible in the present state of the art.

Each gage is most carefully adjusted, tested, and graduated by our Weight Gage Tester, and scaled in one-pound marks.

For accuracy, sensitiveness, and workmanship there are no better gages made.

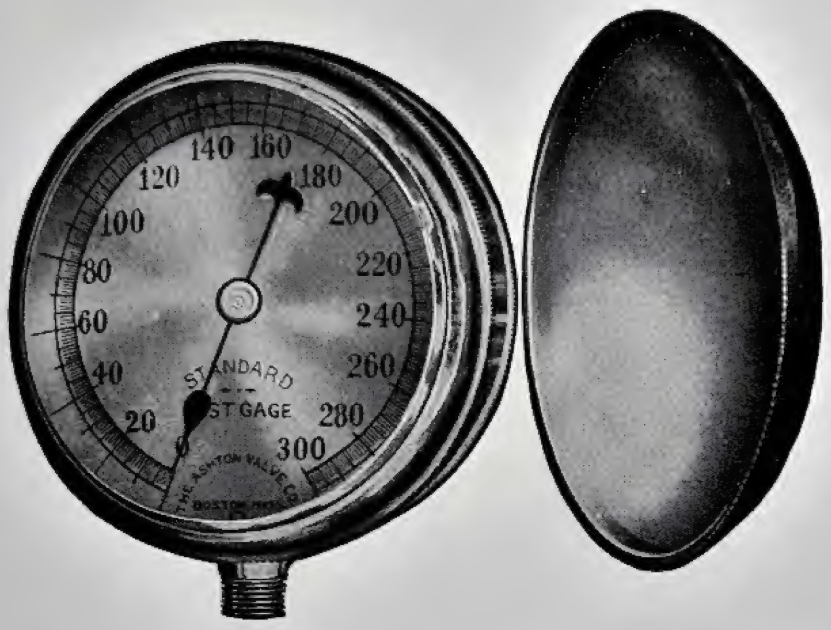
PRICES, INCLUDING COCK.

Size.	Brass Case.	N. P. Case.
10 inch Dial.....	$50.00	$53.00
8½ " "	40.00	42.50
6¾ " "	30.00	32.00
6 " "	25.00	26.50
5½ " "	20.00	21.25
4½ " "	16.00	17.00
3½ " "	14.00	14.75
3 " "	14.00	14.60

Write for Discounts.

For small Pocket Test Gages, see opposite page.

The Ashton Standard Pocket Test Gage.



No. 59A.

There has long been a demand for a neat, light, and accurate test gage of a suitable size and so constructed that it could be carried in the pocket, hand-bag, or otherwise, without danger of injury. The Ashton Standard Pocket Test Gage, as shown in the above cut, is particularly designed to meet these requirements, being made with a bevel plate-glass front and fitted with a cover to insure perfect protection, and is therefore much appreciated and largely used by air-brake inspectors, boiler inspectors, master mechanics, chief engineers, etc.

This Standard Test Gage, like all other Ashton gages, is made with a spring of solid-drawn seamless tubing, non-corrosive movement, and is the best that high grade material and skilled workmanship can produce. It is made in the three-inch dial size, graduated for any pressure up to and including 500 pounds, with full nickel plate, and weighs, complete with cover, about one pound.

PRICE LIST.

Size.	Brass Case.	N. P. Case.
3 inch Dial	$14.00	$14.60

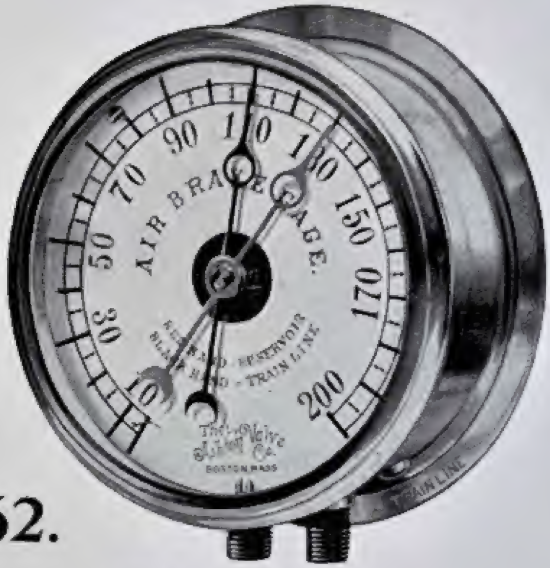
Write for Discounts.

The Ashton Improved Duplex Air Brake Gages.

Standard Style,

Showing O. G. Ring and
Standard Westinghouse Connections.

No. 62.



High Speed Style,

Showing Flush Ring and
Standard New York Connections.

The Ashton Duplex Air Brake Gages embody the combination in one case of two double-spring Bourdon gages acting independent of each other, each having its separate hand, but registering on the same dial and circle of figures. The hands are of different colors, and. as stamped plainly on the dial, the red hand indicates reservoir pressure, and the black hand indicates train line pressure.

Many valuable and exclusive features of merit have been introduced in these gages, which have won for them an unequalled reputation. They are made with a spring stop-pin at the zero mark, which serves as a cushion to prevent the gage hands from being jarred loose or bent when they strike the pin, due to a sudden release of pressure. The gage movements are of solid construction, with German silver pinions and arbors, and the segments of the train line part of the gages, which has to stand most of the wear, are entirely of German silver and extra heavy. The springs are of seamless drawn tubing.

The High Speed Style is specially adapted for the latest high speed brake service, and is made heavier for the higher pressure service used.

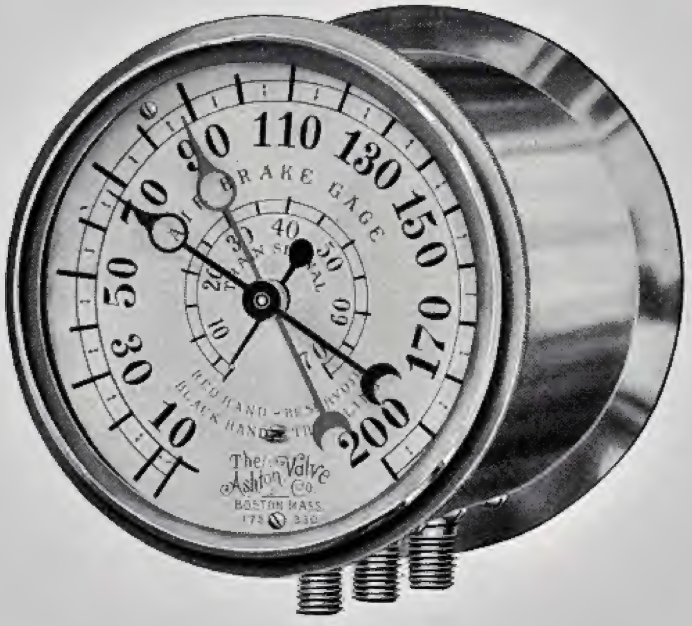
In ordering, it should be specified whetner Standard or High Speed Style is wanted, also whether with Westinghouse or New York Standard connections.

PRICE LIST.

Size.	Brass Deep Case.	Iron Deep Case.
5 inch Dial	$20.00	$17.50

Write for Discounts.

The Ashton Triplex Air Brake and Train Signal Gages.



No. 62A.

The above cut represents an entirely new idea in locomotive gages, which combines in one gage the usual Duplex Air Brake Gage and the Train Signal Gage which compact form has heretofore never been made. All railroads using the air train signal system will readily appreciate the value of this gage and realize that it dispenses with one less gage in the locomotive cab, and locomotive engineers can at one glance read the pressures on both the air brake and train signal systems. There can be no confusion whatever in reading the gage, as the air brake part has exactly the same hands and dial as used on all duplex air brake gages in the past, while the train signal part is entirely different and distinctive, being represented by a smaller, independently-operated dial in the centre, which registers the pressure by revolving around a fixed pointer at the bottom of the dial. It is confidently believed that the Ashton Triplex Air Brake and Train Signal Gages will meet with general favor and acceptance, and railroads desiring to give them a trial have the privilege of ordering them subject to approval only if entirely satisfactory.

PRICE LIST.

Size.	Brass Extra Deep Case.
5 inch Dial.....	$30.00

The Ashton Improved Air Brake Inspector's Test Gage.

WITH HOSE COUPLING CLAMP ATTACHMENT.

No. 68.

The above gage is a handy, compact form of test gage in combination with hose coupling bracket for ready attachment to air brake or signal line couplings. By the use of this gage air brake inspectors are enabled to make their tests at frequent intervals and unobserved, by connecting it direct to the hose couplings at the rear of the train.

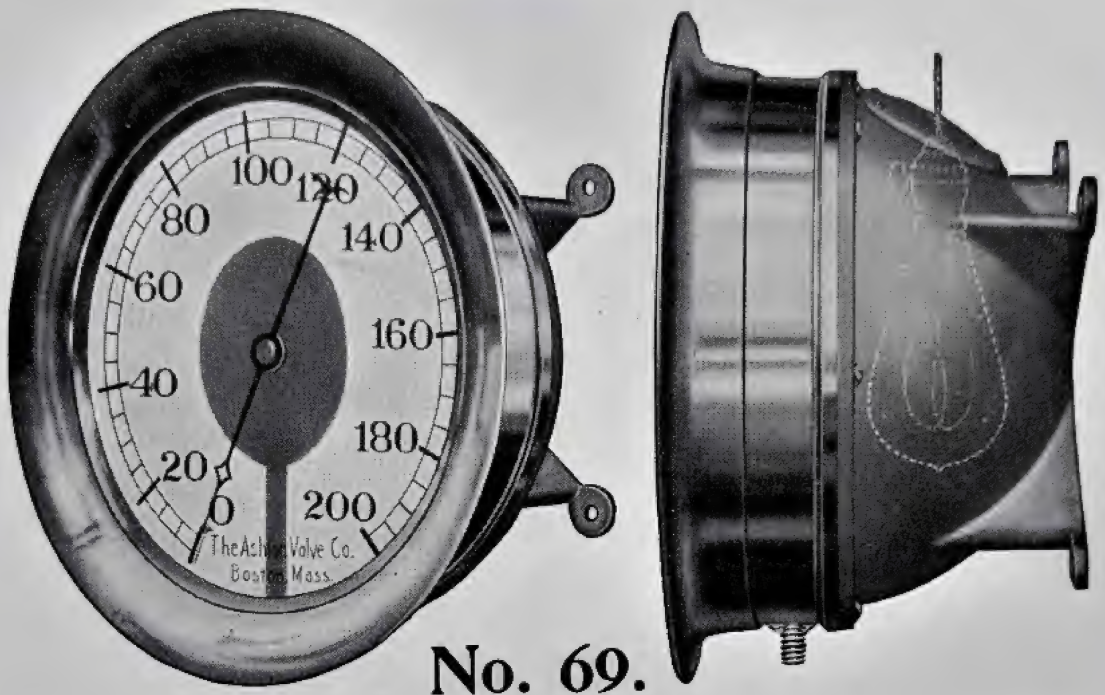
The gage has 2½ inch diameter dial and full nickel plated case. The top and bottom thumb-screw adjustments make possible a perfectly tight connection, and the side valve serves as a drain cock to allow the escape of air pressure between the hose cock and the gage when the cock is shut off after making test.

PRICE LIST.

Size.	Nickel Plated Case.
2½ inch Dial.....	$16.00

Write for Discounts.

The Ashton Illuminated Dial Gage.



No. 69.

The gage, as shown in the above cut, is so constructed that an incandescent electric light may be placed behind it, and by means of a glass back the light is directed through the gage on to the ground glass dial, showing plainly the reading of the pressure marks and the position of the gage hand. The value of such a gage is specially appreciated in poorly-lighted boiler rooms and in cases where it is necessary to run the steam plant at night.

PRICES, INCLUDING COCK.

Single Spring Bourdon Style.

Size.	Iron Case, Brass Ring.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.		
12 inch Dial...	$85.00	$86.00	$90.00	$94.00		
10 " " ...	76.00	77.00	80.00	83.00		
8½ " " ...	62.00	63.00	65.00	67.50		

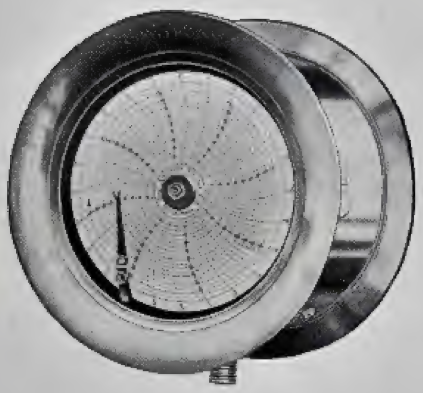
PRICES, INCLUDING COCK.

Double Spring, Bourdon Style.

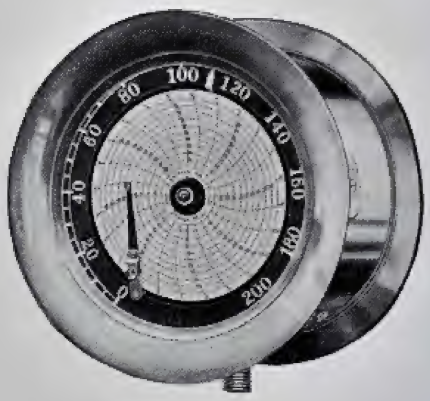
Size.	Iron Case, Brass Ring.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.		
12 inch Dial...	$90.00	$91.00	$95.00	$99.00		
10 " " ...	81.00	82.00	85.00	88.00		
8½ " " ...	66.00	67.00	69.00	71.50		

Write for Discounts.

The Ashton Improved Pressure and Vacuum Recording Gages.



No. 73.
Recording Gage.



No. 74.
Recording and Indicating.

The Ashton Recording Gages are carefully constructed of the best materials and workmanship, the clock movement being particularly high grade and made specially for the purpose, thus insuring absolute accuracy and durability. They are adaptable for steam, water, ammonia, air or gas, and in steam boiler plants insure careful firing, steady pressure, and greater efficiency and economy.

The Style No. 73 produces a daily record or chart, showing the exact variations in pressure, both day and night, giving the time and duration of all changes. The pressure line is recorded in red ink on the paper chart, which is graduated in pressure lines, and also fractions of an hour.

The Style No. 74 has the additional feature of an indicating hand and figured dial outside the recording chart, whereby the pressure can easily be read at any time.

Charts can be furnished for pressure, vacuum, or compound pressure and vacuum. One year's supply of charts, ink, and pen filler is furnished with each instrument.

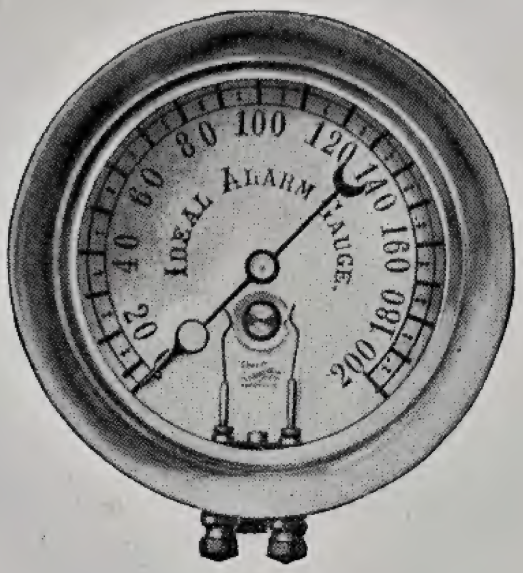
PRICE LIST.

Finish.	Iron Case—Brass Ring.					Iron Case—N. P. Ring.				
Size.	6	6¾	8½	10	12	6	6¾	8½	10	12
Pressure Recording, Style No. 73,	$32.00	$36.00	$44.00	$58.00	$76.00	$32.75	$36.75	$44.75	$59.00	$77.00
Vacuum Recording	32.00	36.00	44.00	58.00	76.00	32.75	36.75	44.75	59.00	77.00
Compound Pressure and Vacuum Recording	.....	43.50	51.50	65.50	87.00	.....	44.25	52.25	66.50	88.00
Pressure Recording and Indicating, Style 74	.....	43.50	51.50	65.50	87.00	.....	44.25	52.25	66.50	88.00
Vacuum Recording and Indicating	.....	43.50	51.50	65.50	87.00	.....	44.25	52.25	66.50	88.00
Compound Pressure and Vacuum Recording and Indicating	.....	51.00	59.00	73.00	91.00	.....	51.75	59.75	74.00	92.00

Finish.	Brass Case.					N. P. Case.				
Size.	6	6¾	8½	10	12	6	6¾	8½	10	12
Pressure Recording, Style No. 73,	$35.00	$40.00	$50.00	$65.00	$85.00	$36.50	$42.00	$52.50	$68.00	$89.00
Vacuum Recording	35.00	40.00	50.00	65.00	85.00	36.50	42.00	52.50	68.00	89.00
Compound Pressure and Vacuum Recording	.....	47.50	57.50	72.50	96.00	.....	49.50	60.00	75.00	100.00
Pressure Recording and Indicating, Style 74	.....	47.50	57.50	72.50	96.00	.....	49.50	60.00	75.00	100.00
Vacuum Recording and Indicating	.....	47.50	57.50	72.50	96.00	.....	49.50	60.00	75.00	100.00
Compound Pressure and Vacuum Recording and Indicating	.....	55.00	65.00	80.00	100.00	.....	57.00	67.50	83.00	104.00

Write for Discounts.

The Ideal Alarm Gage.



No. 78.

The Ideal Alarm Gage is a new and improved design of a pressure (or vacuum) gage combined with an automatic electric circuit closing attachment, which can be operated to give an electric bell alarm at any desired pressure and at any distance away from the gage.

There are many important applications for such a gage on boilers or pipe line systems, where an automatic alarm is desired to be given at either a high or low pressure point, or both.

On dry pipe sprinkler systems this gage is of incalculable value, as has already been demonstrated. It takes the place of the usual air gage, as well as the circuit closer, and gives a timely warning against over-pressure and unnecessary flooding of the systems due to leaks or accidents when there is no fire, thus saving what might otherwise result in considerable damage and loss.

Trial orders are solicited.

PRICE LIST.

Size.	Iron Case.
5 inch Dial	$50.00

Write for Discounts.

The Ashton Crank Index.

No. 67.

This instrument is used principally in marine service, and is placed in the engine room to indicate to the engineer when working the engines by the starting bar the position of the crank or cross head when either cannot be seen from the engineer's position.

PRICE LIST.

Size.	Brass Case and Ring.
8½ inch Dial	
10 " "	$50.00
12 " "	60.00
.....	75.00

Write for Discounts.

The Ashton Locomotive and Marine Clocks.

No. 63.

The Howard and Boston movements are full jeweled, with chronometer balance, and have patented regulators.

The cases are made with hinged rings and snap latch, or lock and key when desired.

PRICE LIST.

Size.	Movement.	Time.	Brass Case.	N. P. Case, O. G. or Oct. Ring.
12 inch Dial.....	Howard	8 day	$110.00	$114.00
10 " "	"	"	90.00	93.00
8½ " "	"	"	80.00	82.50
6¾ " "	"	"	70.00	72.00
12 " "	Seth Thomas	"	90.00	94.00
10 " "	"	"	65.00	68.00
8½ " "	"	"	55.00	57.50
6¾ " "	"	"	45.00	47.00
12 " "	Boston	"	90.00	94.00
10 " "	"	"	65.00	68.00
8½ " "	"	"	55.00	57.50
6¾ " "	"	"	45.00	47.00
6 " "	"	"	40.00	41.50
5½ " "	"	"	38.00	39.25
5 " "	"	"	35.00	36.00
4½ " "	"	"	33.00	34.00

Write for Discounts.

The Howard and Seth Thomas Clocks are furnished only in deep cases, but the Boston Clock in either deep or shallow cases. Clocks of different sizes from the above list will be charged at the price of the next size larger.

Special net prices on Yankee Clocks.

The Ashton Square Counters.

No. 65.

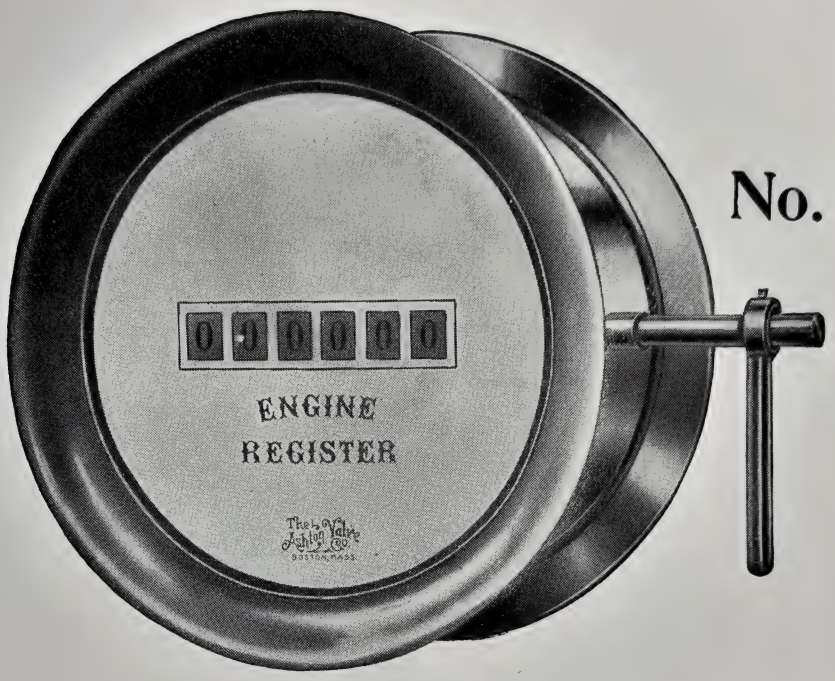
Our Square Counters have positive motion similar to our Engine Registers and will work also under varying lengths of stroke or revolving motions.

PRICE LIST.

Size.	Number of Figures.	Plain.	Resetting.
7 x 2½ inch, large size	4	$20.00	$24.00
8 x 2½ " " "	5	24.00	28.00
9 x 2½ " " "	6	28.00	32.00
10 x 2½ " " "	7	32.00	36.00
4½ x 1¾ " small size	4	17.50	21.50
5 x 1¾ " " "	5	20.00	24.00
5½ x 1¾ " " "	6	24.00	28.00
6 x 1¾ " " "	7	28.00	32.00

Write for Discounts.

The Ashton Improved Engine Registers.



No. 64.

These instruments are for either right or left revolutions and reciprocating motions, and work equally well under varying lengths of stroke or revolving motions.

Unless otherwise ordered, they are driven from the right-hand side by a lever, as shown in the cut.

This style register has positive movement, is durable, accurate, and reliable.

PRICE LIST.

Size.	Brass Case.	N. P. Case, O. G., or Oct. Ring.
12 inch, 8 wheels	$110.00	$114.00
10 " 8 "	95.00	98.00
8½ " 8 "	80.00	82.50
12 " 6 "	100.00	104.00
10 " 6 "	85.00	88.00
8½ " 6 "	70.00	72.50
6¾ " 6 "	60.00	62.00
6 " 6 "	50.00	52.00

Write for Discounts.

Always state number of wheels in ordering.

The Ashton Chemical Gage.

No. 61.

These gages are specially adapted for use in service where the springs of the gages require protection from the corroding action of liquids and chemicals, such as on soda water apparatus, chemical engines, etc., for which ordinary gages cannot be used.

The pressure acts on a tapered volute, or coiled steel spring, which is protected by an elastic diaphragm from direct contact with the pressure. The gage can be repaired very easily.

PRICE LIST.

Size.	Iron Case, Brass Ring.	Iron Case, N. P. Ring.	Brass Case.	N. P. Case.
12 inch Dial.....	$78.00	$79.50	$98.00	$102.00
10 " "	57.00	58.00	68.00	71.00
8½ " "	45.00	45.75	55.00	57.50
6¾ " "	40.00	40.60	45.00	47.00
6 " "	35.00	35.50	39.00	40.50
5½ " "	30.00	30.50	33.00	34.25
5 " "	30.00	30.50	33.00	34.25
4½ " "	25.00	25.50	27.00	28.00

Write for Discounts.

The Ashton Marble or Slate Tablets.

Style A.

These Tablets, like those on the following pages, are some of the most attractive designs for gages, both as to neatness of appearance and economy of space. They can be furnished in any style of marble or slate desired, and the prices include the necessary acorn nuts and gage screws. Name Plates and wall bolts are always extra.

PRICE LIST.

Size.	Style A.
For two 5 inch Gages	$4.00 net.
" " 5½ " "	4.50 "
" " 6 " "	5.00 "
" " 6¾ " "	6.00 "
" " 8½ " "	7.50 "
" " 10 " "	9.00 "
" " 12 " "	10.00 "

Gage Tablets of special design quoted on application.

The Ashton Marble or Slate Tablets.

Style B.

PRICE LIST.

Size.	Style B.
For three 5 inch Gages	$5.00 net.
" " 5½ " "	5.50 "
" " 6 " "	6.00 "
" " 6¾ " "	7.00 "
" " 8½ " "	9.50 "
" " 10 " "	12.00 "
" " 12 " "	14.00 "

For prices of Name Plates see page 86.

The Ashton Marble or Slate Tablets.

Style C.

PRICE LIST.

Size.	Style C.
For four 5 inch Gages	$6.00 net.
" " 5½ " "	6.50 "
" " 6 " "	7.00 "
" " 6¾ " "	8.00 "
" " 8½ " "	11.50 "
" " 10 " "	15.00 "
" " 12 " "	18.00 "

For prices of Name Plates see page 86.

Marble or Slate Tablets.

Style D.

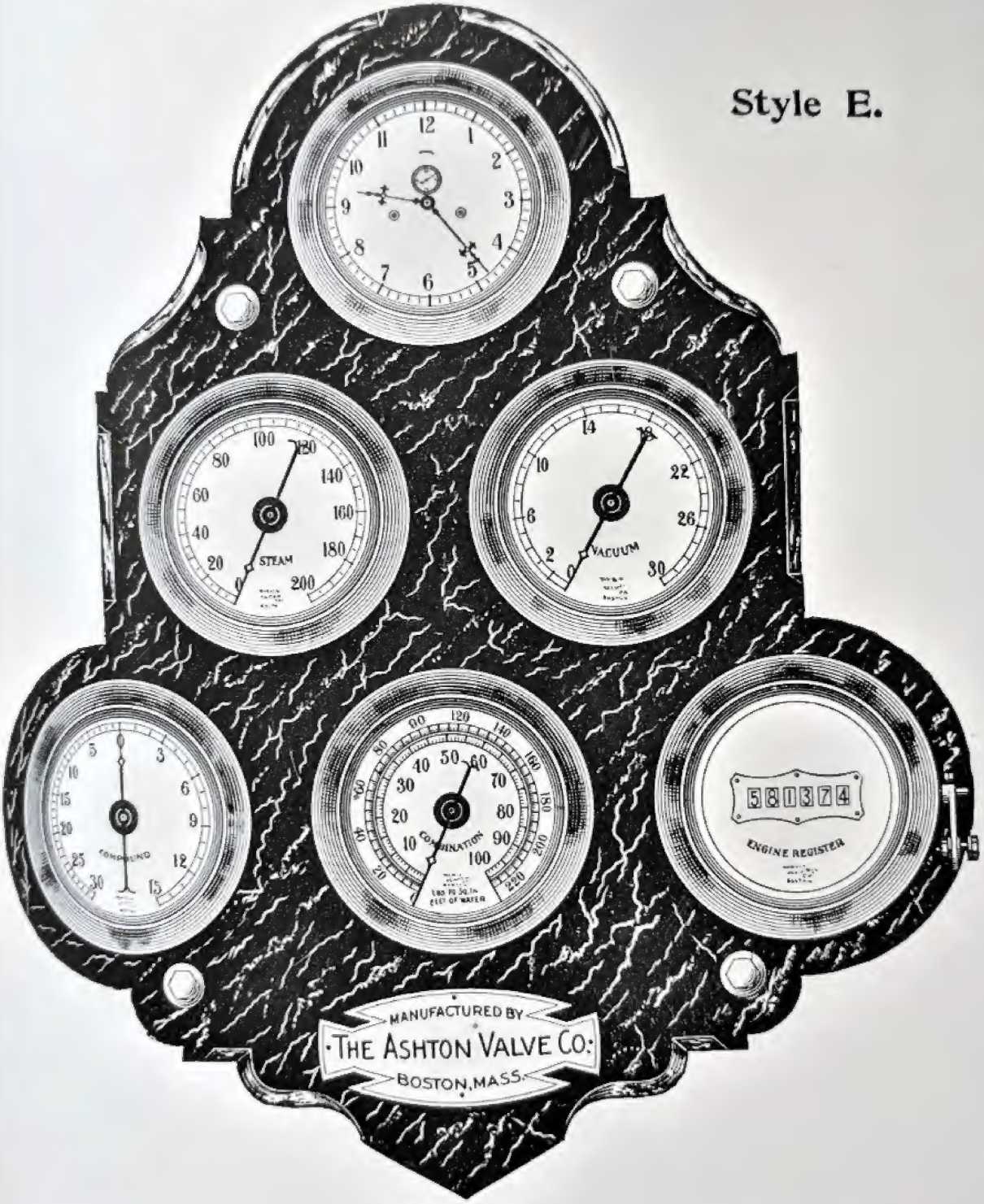
PRICE LIST.

Size.	Style D.
For five 5 inch Gages	$7.00 net
" " 5½ " "	7.50 "
" " 6 " "	8.00 "
" " 6¾ " "	9.00 "
" " 8½ " "	13.50 "
" " 10 " "	18.00 "
" " 12 " "	22.00 "

For prices of Name Plates see page 86.

Marble or Slate Tablets.

Style E.



PRICE LIST.

Size.	Style E.
For six 5 inch Gages	$8.50 net
" " 5½ " "	9.00 "
" " 6 " "	9.50 "
" " 6¾ " "	10.50 "
" " 8½ " "	16.00 "
" " 10 " "	22.00 "
" " 12 " "	27.00 "

For prices of Name Plates see page 86.

Gage Frame for Set of Four Instruments.

Style No. 1.

Made in either Black Walnut, Ash, or Oak. For prices see page 86.

Gage Frame for Set of Five Instruments.

Style No. 2.

Made in either Black Walnut, Ash, or Oak. For prices see page 86.

Wood Gage Frames.

PRICE LIST.

Size.	Style No. 1, Page 84.	Style No. 2, Page 85.
For two 6 inch Dial Instruments	$8.00	....
" three 6 " " "	13.00	....
" four 6 " " "	16.00	$22.00
" five 6 " " "	20.00	30.00
" seven 6 " " "	....	40.00
" two 6¾ " " "	13.00	....
" three 6¾ " " "	15.00	....
" four 6¾ " " "	20.00	27.00
" five 6¾ " " "	25.00	35.00
" seven 6¾ " " "	....	45.00
" two 8½ " " "	15.00	....
" three 8½ " " "	20.00	....
" four 8½ " " "	25.00	33.00
" five 8½ " " "	30.00	42.00
" seven 8½ " " "	....	55.00
" two 10 " " "	18.00	....
" three 10 " " "	22.00	....
" four 10 " " "	30.00	40.00
" five 10 " " "	35.00	52.00
" seven 10 " " "	....	70.00
" two 12 " " "	20.00	....
" three 12 " " "	25.00	....
" four 12 " " "	32.00	48.00
" five 12 " " "	38.00	60.00
" seven 12 " " "	....	80.00

Price List of Name Plates.

Name Plates for Wood Gage Frames or Marble and Slate Gage Tablets are charged extra at 15 cents per letter for ordinary sizes of letters.

The Ashton Inspectors' Testing and Proving Outfit.

The above outfit is particularly designed to meet the requirements of Boiler and Power Plant Inspectors, Mechanical and Chief Engineers, as it is accurate, durable, light weight, and easily portable. The outfit consists of the following nickel-plated instruments: Three-inch Standard Test Gage, Screw Test Pump, Gage Hand Puller, Hand Set, Lever Handle Union Gage Cock and Screw Driver, all neatly and compactly contained in velvet-lined leather case, fitted with lock and handle. The approximate weight of this outfit is eight pounds.

Price, $45.00 each.

Write for Discounts.

The Ashton Improved Dead Weight Pressure Gage Testers.

(Patented.)

No. 79 Double Area Tester.

These machines offer the most improved method for obtaining an accurate testing of pressure gages by means of weights, and are recognized and adopted as a standard for measuring pressures. They are equal in accuracy to a mercury column, as heretofore used, and are more convenient and much less expensive.

The No. 79 Style Gage Tester has an adjustable double area piston, which makes it possible to secure both low and high pressure testing up to a maximum of 1,000 lbs. per square inch, and yet requiring but one-fourth the usual number of weights. The means of adjustment, to change from the double area for low pressure work to the single area for high pressure, is embodied in two small valves placed on opposite sides of the vertical cylinder, as shown in the above cut. These can be regulated as desired at a moment's notice while the machine is in use and without in any way taking it apart.

For price and equipment, see opposite page.

The Ashton Improved Dead Weight Pressure Gage Testers

(Patented.)

Nos. 79 A. B. and C. Single Area Testers.

The above style Gage Testers are similar to the No. 79, but have the ordinary form of single area piston, and are intended for lower pressure testing not to exceed 500 lbs. per square inch. They are equally durable and reliable for this service as the double area style.

The following prices include complete equipment of necessary weights with tools, consisting of a screw driver, oil can, gage hand puller, hand set, and six connecting nipples for attaching gages. They are all packed in two separate cases with substantial handles, so as to be easily carried.

The gage shown in cut is not furnished, being merely an illustration of a gage as applied for test.

PRICE LIST.

Size.	Price.
No. 79 Style for testing to 1,000 lbs.....	$100.00
No. 79A " " " " 500 "	84.00
No. 79B " " " " 300 "	72.00
No. 79C " " " " 200 "	60.00

Write for Discounts.

The Ashton No. 1 Standard Lever Test Pump.

This Pump and Stand make a very complete and substantial apparatus for testing gages. It is made with three connections, so that two gages can be tested and compared with the test gage at the same time, and is suitable for pressures up to three hundred pounds. Railroads and others using large numbers of gages will find this pump specially desirable.

Price without gage, $50.00.

For price of Test Gages see pages 66 and 67.

Write for Discounts.

The Ashton
No. 2 Lever Pump and Test Gage.

Our No. 2 Pump is compact, neat, and durable.

It occupies only a space of nine inches square.

PRICE LIST.

No. 2 Pump and Gage complete, nickel plated, in velvet-lined black walnut box, with lock, key, and handles, nickel-plated trimmings, and small tools	$75.00
No. 2 Pump only, nickel plated	50.00
No. 2 Pump only, plain brass	40.00

The Ashton
No. 3 Screw Pump and Test Gage.

Our No. 3 Screw Pump is especially adapted for Boiler Inspectors.

PRICE LIST.

No. 3 Screw Pump and 3½-inch Test Gage, all nickel plated	$30.00
No. 3 Screw Pump and 3½-inch Test Gage, plain brass	28.00
No. 3 Screw Pump only, nickel plated,	14.00
No. 3 Screw Pump only, brass	12.00

For price of Test Gages see pages 66 and 67.

Write for Discounts.

The Ashton
Gas Proving Pumps and Gages.

No. 77.

These Pumps and Gages are for gasfitters' use in testing pipes for leakages. The Gages are usually furnished with covers as a protection to the glass.

PRICE LIST.

Pump, Gage, Ether Cup, and Hose, complete	$16.00
Pump and Hose only	8.00
Brass Case Gage, 3-inch dial, with cover	5.00
Ether Cup and Cock	3.00

Write for Discounts.

The Ashton Common Steam Whistles and Whistle Valves.

Fig. 1.
Without Valve.

No. 90.

Fig. 2.
With Side Valve.

PRICE LIST.

Diameter of Bell.	Size of Steam Pipe.	Whistle, Fig. 1.	Whistle, Fig. 2.	Whistle Valves.
1 inch	¼ inch	$4.50	$8.00	$2.00
1¼ "	⅜ "	5.50	9.00	2.00
1½ "	½ "	6.25	9.50	2.50
2 "	½ "	9.00	13.00	2.50
2½ "	¾ "	10.50	15.00	3.00
3 "	¾ "	13.00	19.00	3.00
3½ "	1 "	17.50	23.00	4.40
4 "	1 "	21.00	30.00	4.40
5 "	1¼ "	30.00	42.00	5.60
6 "	1½ "	43.00	65.00	7.40
8 "	2 "	61.00	95.00	14.00
10 "	2½ "	80.00	125.00	18.00
....	3 "	....	....	29.50

Write for Discounts.

In ordering state Figure and Diameter of Bell.

The Ashton Improved Single Bell Chime Steam Whistles.

Fig. 1.
Without Valve.

No. 91.

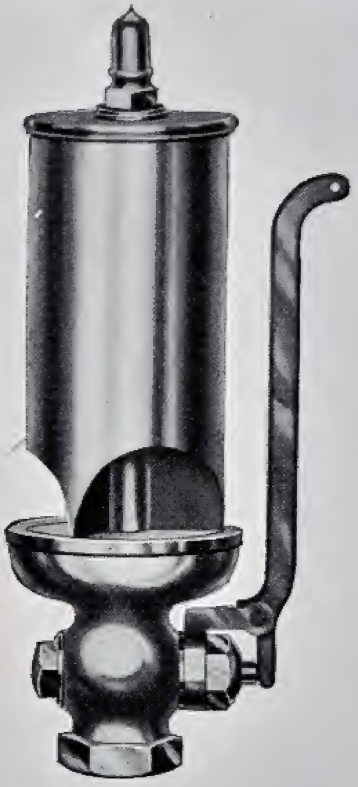


Fig. 3.
With Side Valve.

Ashton Chime Whistles produce an agreeable sound in contrast to the harshness of the common whistle, and besides are far more penetrating. They are solid in construction and of best steam metal, insuring great durability and satisfaction.

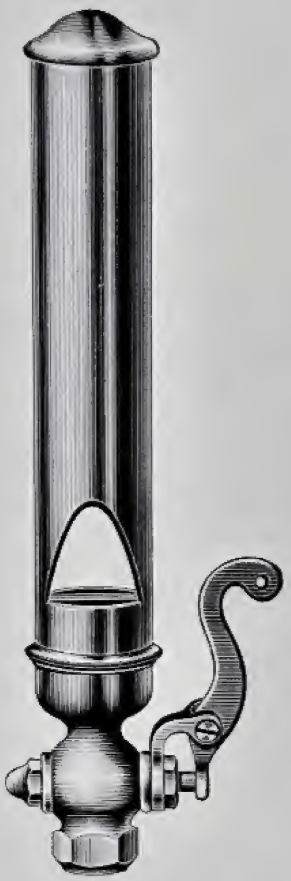
PRICE LIST.

Diameter of Bell.	Size of Steam Pipe.	Fig. 1.	Fig. 3.
1½ inch	¼, ⅜, or ½ inch	$4.50	$6.50
2 "	½ "	6.50	10.00
3 "	¾ "	11.00	15.00
4 "	1 "	17.00	22.00
5 "	1¼ "	26.00	31.00
6 "	1½ "	38.00	45.00
8 "	2 "	60.00	70.00
10 "	2½ "	95.00	115.00
12 "	3 "	180.00	200.00

Write for Discounts.

In ordering state Figure and Diameter of Bell.

The Ashton Organ Whistle.



No. 92.

The Ashton Organ Whistle, as above shown, is a modified form of the common whistle, having an extra long bell which gives a very low, full tone. It is largely used on ocean steamers, being preferred by many for this class of service.

PRICE LIST.

Size of Steam Pipe.	Diameter of Bell.	Length of Bell.	Price.
½ inch.	1¼ inch.	9 inches.	$9.00
½ "	1¾ "	10 "	13.00
¾ "	2 "	11 "	19.00
¾ "	2½ "	12 "	25.00
1 "	3 "	17 "	32.00
1 "	3½ "	19 "	40.00
1¼ "	4 "	20 "	60.00

Write for Discounts.

The Ashton Siphons and Cocks.

FIG. 1.

FIG. 2.

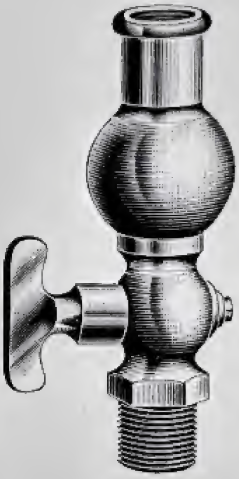


FIG. 3.

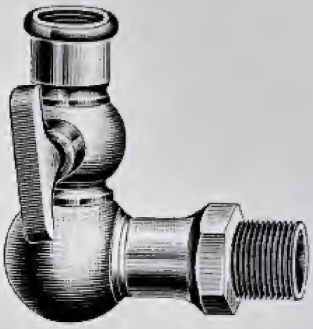
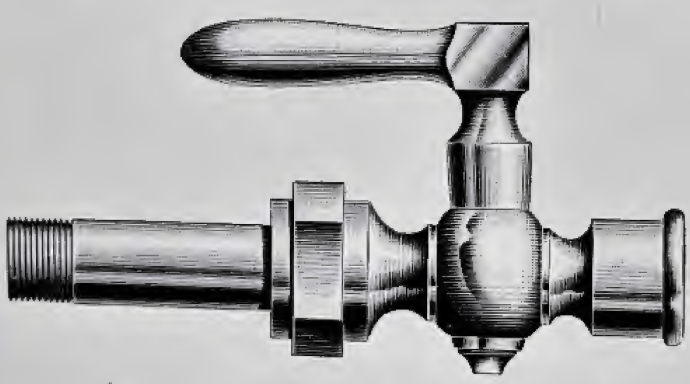


FIG. 4.



Lever Handle Union Steam Gage Cock.

T Handle Steam Gage Cock.

PRICE LIST.

Siphons and Cocks.	Brass.	N. P.
Common Iron Pipe Siphon, each	$0.25	....
Common Brass Pipe Siphon, each	1.00	$1.50
Common T Handle Brass Cock	.50	.75
Heavy T Handle Brass Cock	1.00	1.50
Small Union, Brass Cock	1.50	2.00
Large Union, Brass Cock	2.00	2.50
Straight Siphon, without cock, Fig. 1	1.00	1.50
Elbow Siphon, without cock, Fig. 2	1.25	1.75
Straight Siphon, with cock, Fig. 3	1.50	2.00
Elbow Siphon, with cock, Fig. 4	1.50	2.00

Write for Discounts.

Siphons must be used with steam gages.

The Ashton Compression Gage Cock.

No. 93.

PRICE LIST.

Size.	Wood Wheels.	Brass.	Nickel Plated.
⅛ in.	Without Stuffing Box	$0.70	$0.75
¼ in.	Without Stuffing Box	.75	.80
⅜ in.	Without Stuffing Box	.95	
	With Stuffing Box	1.20	
½ in.	Without Stuffing Box	1 00	
	With Stuffing Box	1.30	
¾ in.	Without Stuffing Box	1.25	
	With Stuffing Box	1.45	

Write for Discounts.

The Ashton Gage Hand Puller.

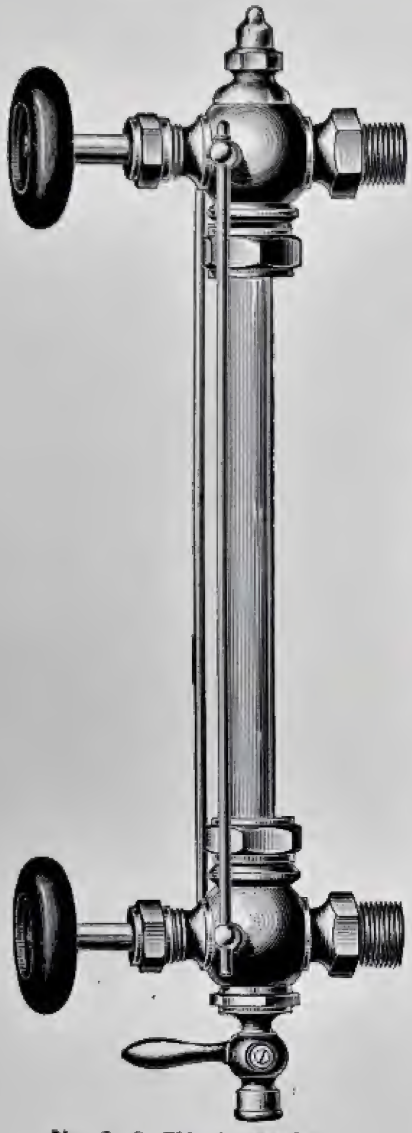
Our Gage Hand Puller is a valuable and handy little tool for easily taking off gage hands. It is made in two sizes, the small size for gages up to 8½ inch, and the large size for 8½-inch gages and larger.

No. 94.

Price, $1.50 each.

Write for Discounts.

The Ashton Common Water Gages.



No. 0, 3, 7½, 14 Styles.

No. 71. Automobile Style.

No. 70. Automobile Style.

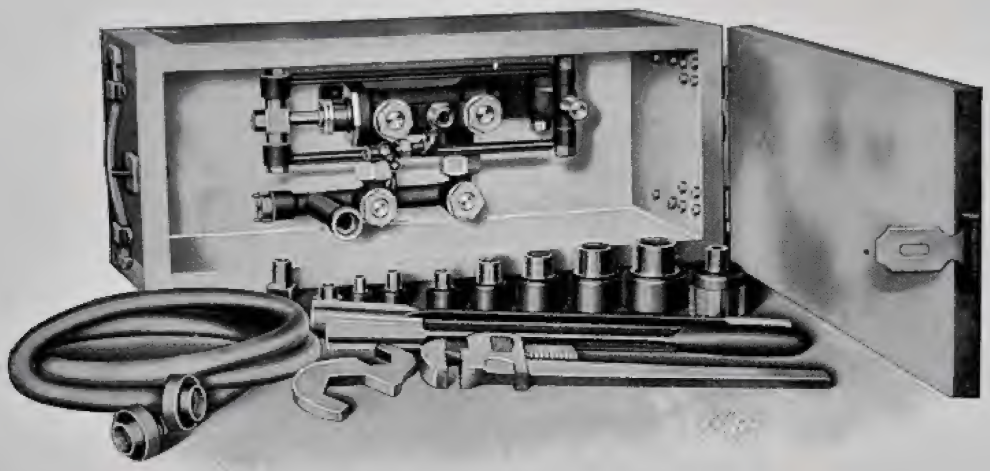
No. 000, 1, 1½ Styles.

PRICE LIST.

No. Style.	Threaded, inches.	Size Glass, inches.	No. Rods.	Description.	Wheels.	Brass.	Nickel Plated.
000	⅜	⅝ x 10	2	Rough Body, bronzed.....	Iron	$2.75	....
0	⅜	⅝ x 10	2	Finished Body	Wood	3.75	...
1	½	⅝ x 12	2	Rough Body, bronzed.....	Iron	3.00	....
3	½	⅝ x 12	2	Finished Body	Wood	4.25	....
9	½	⅝ x 12	4	Finished Body (square)	Wood	6.00	...
1½	¾	¾ x 16	2	Rough Body, bronzed.....	Iron	4.50	....
7½	¾	¾ x 16	2	Finished Body	Wood	5.50	....
9½	¾	¾ x 16	4	Finished Body (square)	Wood	8.00	....
14	¾	¾ x 16	4	Finished Body, extra heavy	Wood	15.00	....
70	⅛	½	4	(Automatic) Rod Pattern, finished ...	Wood	5.00	$5.50
70	¼	½	4	(Automatic) Rod Pattern, finished ...	Wood	5.00	5.50
71	⅛	½	Shield	(Automatic) Elbow Pattern, finished..	None	6.00	6.50
71	¼	½	Shield	(Automatic) Elbow Pattern, finished..	None	6.00	6.50
70 & 71	⅛ & ¼	½	2	(Without Automatics), finished	....	4.00	4.50

Write for Discounts.

The Ashton Portable Boiler Test-Pump.



SPECIALLY ADAPTED FOR THOSE HAVING FREQUENT OCCASION TO MAKE HYDROSTATIC TESTS OF BOILERS OR TANKS.

Used by the Inspectors of the Boiler Inspection Department of the Massachusetts District Police, as well as by prominent Boiler Insurance Companies.

The above cut shows the Ashton Portable Boiler Test-Pump, with complete outfit of hose and all necessary fittings and tools, as usually furnished, all packed in substantial locked case. The following special features of construction of practical value are embodied in this equipment.

The pressure service to which it is adapted is 400 lbs. per square inch. The case is metallic lined and water tight, therefore can be used as a reservoir for the pump to draw from. The pump has a supplementary water-service connection which can be used for the supply instead of the tank.

There are no parts of iron to rust, the pump being made entirely of high-grade composition metal. The suction valves can be taken out for repairs or the piston repacked without removing the pump body.

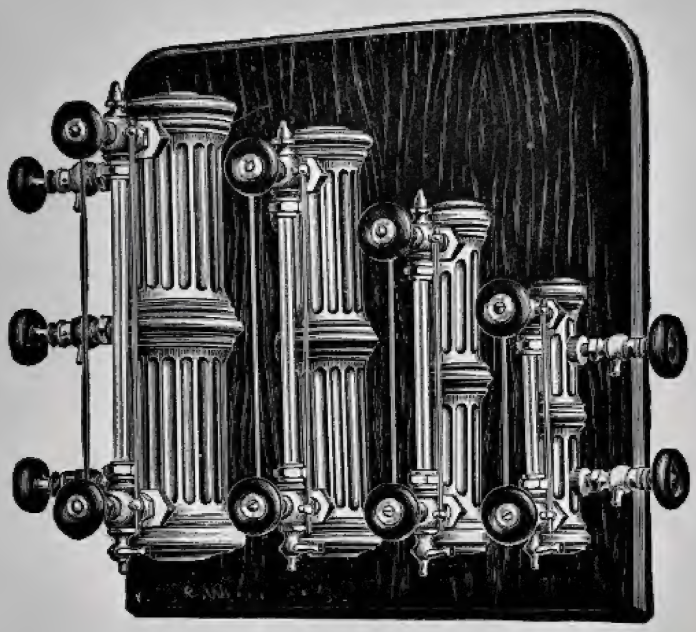
The case is heavily bound with metal corners to stand rough handling in transportation.

Price, $100 Complete.

Write for Discounts.

The Ashton Water Columns.

FOR WATER GAGES AND GAGE COCKS.



Bronzed Iron Water Columns.

These columns are tapped for ⅜ inch, ½ inch, or ¾ inch fittings, according to size, and have boiler connections 1 inch or 1¼ inch, as desired.

A siphon must always be used between gage and water column.

Prices for the columns only; they do not include water gages or gage cocks, steam gage or siphon.

For prices on water gages and gage cocks see preceding pages.

PRICE LIST.

Style.	No. 1.	No. 2.	No. 3.	No. 4.
Total length in inches	11½	15½	18¾	21
Length glass in inches	7	10	13	15
Price	$2.50	$3.00	$4.00	$5.00

Write for Discounts.

Price of all brass column bodies furnished on application.

Moncrieff's
Genuine Scotch Glass Tubes.

These Gage Glasses are imported direct from Perth, Scotland. The size is labeled on end of each package, making them more desirable for stock. We warrant them genuine and equal to any in the market.

Lengths not regular charged the price of next longer tubes of same diameter.

The Glasses will stand very high pressure, bear great variation of temperature, and need never break until they are fairly worn out by friction, if care is taken in the packing.

REVISED PRICE LIST.

PRICE PER DOZEN.

Length, inches.	External Diameter.			
	½ inch and ⅝ inch.	¾ inch.	⅞ inch.	1 inch.
10	$3.00	$3.60	$5.04	$6.12
11	3.24	3.96	5.64	6.72
12	3.60	4.32	6.12	7.32
13	3.84	4.80	6.60	7.92
14	4.20	5.16	7.08	8.52
15	4.44	5.52	7.56	9.12
16	4.80	5.88	8.16	9.72
17	5.04	6.24	8.64	10.32
18	5.40	6.60	9.12	10.92
19	5.64	7.08	9.60	11.52
20	6.00	7.44	10.20	12.12
22	6.60	8.16	11.16	13.44
24	7.20	8.88	12.12	14.64
30	9.00	11.16	15.24	18.24
36	10.80	13.44	18 24	21.96
48	14.52	18.00	24.36	29.16
60	18.12	22.56	30.48	36.48
72	21.84	27.12	36.48	43 80

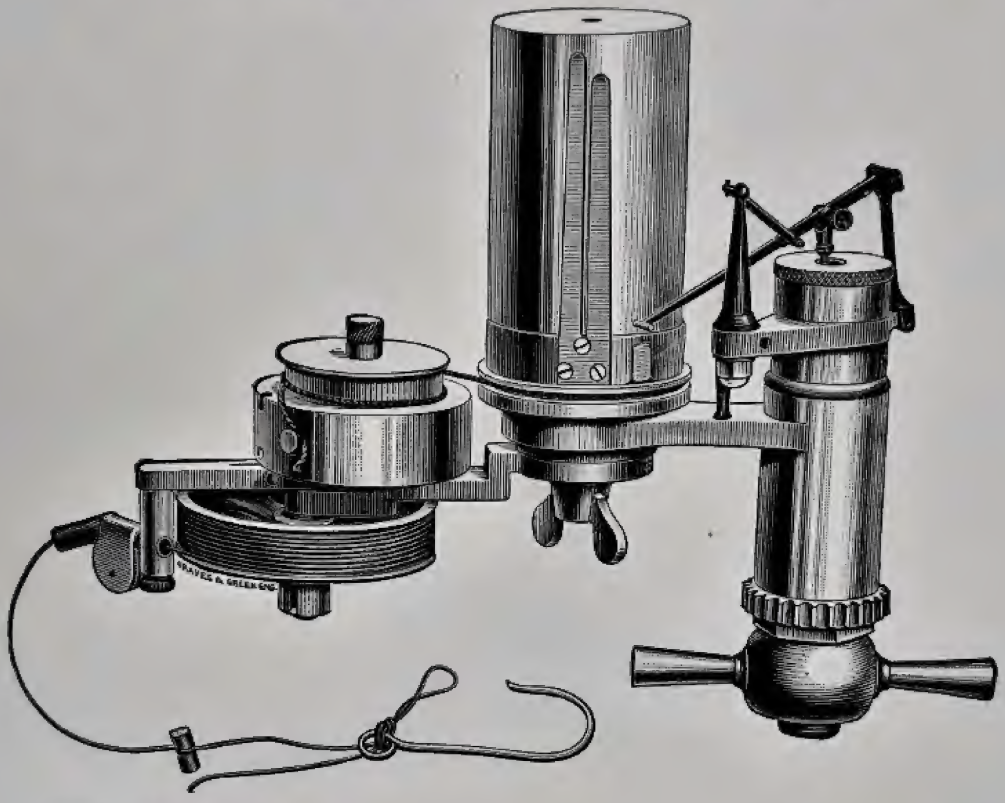
Write for Discounts.

60 x 1¼ incnes, $60.00.

Sizes longer than 24 inches, Special Discount.

The Thompson Improved Indicator.

Patented August 31, 1875, July 12, 1881, and June 26, 1883.



Price List of Thompson Improved Indicator and Extra Fixtures.

Thompson Indicator, nickel plated and complete with one spring, *in the instrument*, one scale, two cocks, all necessary wrenches to use on the instrument, one screw-driver, one bottle watch oil, and Pray's "Twenty Years with the Indicator," all enclosed in a neat mahogany box		$85.00
Extra Piston, ¼ inch area		10.00
" Springs,	each	5.00
" Boxwood Scales,	"	.50
" Steel Scales,	"	1.00
Extra Cocks,	each	$2.75
" Elbows,	"	1.50
Three-way Cock,	"	6.00
Single Carrying Pulley,	"	.60
Double " "	"	1.20
Parallel Rule		7.00
Reducing Pulley		25.00
Clamps		3.00
Metallic Cards, per 1,000, net		5.00
Common Cards, " 1,000, "		2.50
Detent Motion, net		10.00
Pantograph		10.00
Planimeter		15.00

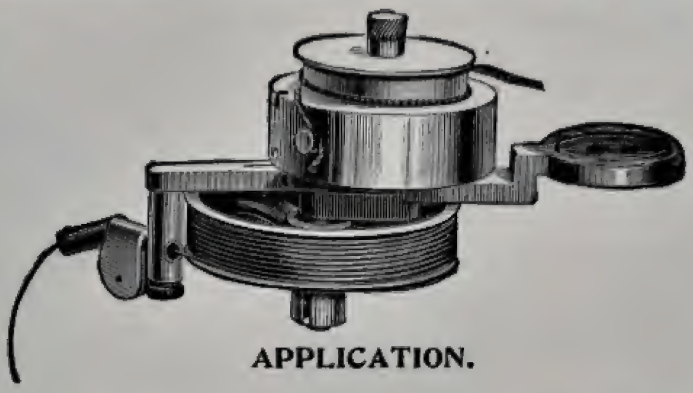
Steel Indicator.

Thompson Improved Indicators, all steel, to withstand the action of the ammonia used in ice and refrigerating machines.

Price complete, with fixtures, $110.00 each.

Write for Discounts.

Aluminum Ideal Reducing Wheel.



APPLICATION.

A device for reducing the motion of an engine cross-head to that required for the paper drum of an Indicator.

For either Upright or Horizontal Engines of not over 6-ft. stroke.

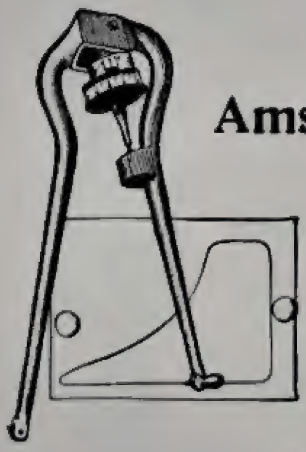
ADVANTAGE.

Ease and Quickness of Application.

With cylinder arranged for the applying of Indicator a card can be taken at any time without stopping engine inside of ten minutes.

The elaborate preparation and time necessary to adjusting pantograph or pendulum entirely done away with.

Price, $15.00 each.



Amsler's Polar Planimeter.

For measuring the area of Indicator Diagrams. By use of this instrument the whole work of measuring a diagram can be done in a very short time.

Price, $15.00 each.

Indicator Springs.

To adapt the Indicator to all pressures we furnish Springs to any desired scale. The following are the most generally used: 8, 10, 12, 16, 20, 24, 30, 32, 40, 48, 50, 56, 60, 64, 80, 100. For pressures from 65 to 85 pounds a 40-pound spring is best adapted, for, as 40 pounds pressure on a 40-pound spring will raise pencil one inch, 80 pounds pressure on the same spring will raise pencil about two inches, which is the usual height of a diagram.

Price of extra Springs, $5.00 each.

Write for Discounts.

Thermometers.

FOR STEAM AND HOT WATER HEATING.

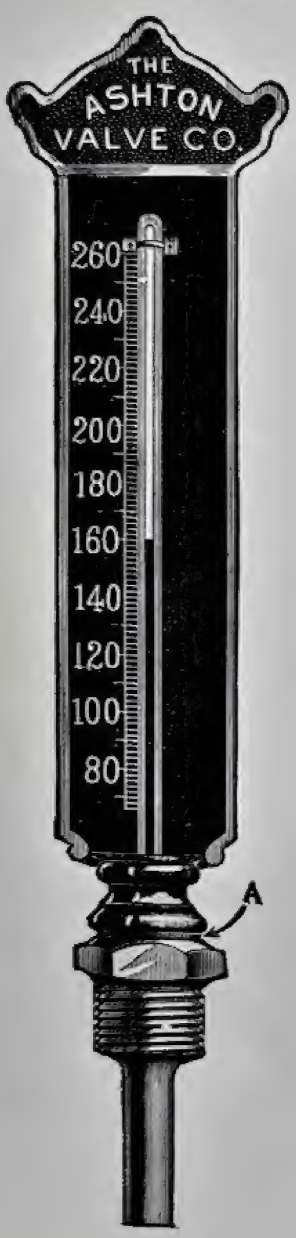


Fig. 1.

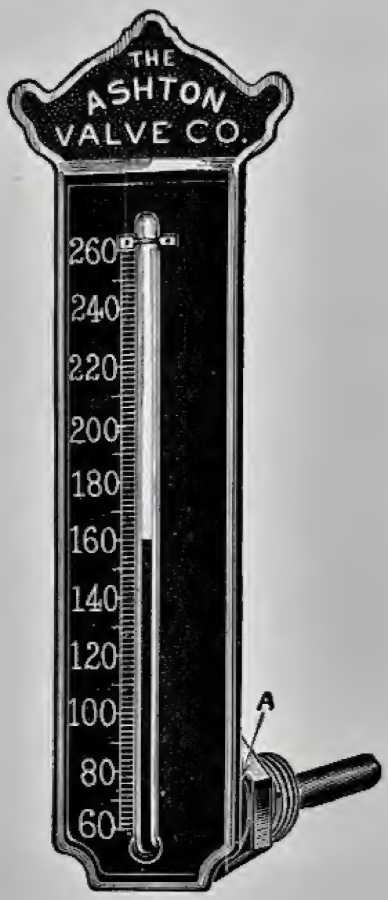


Fig. 3.

These Thermometers made with either silvered or black metal dials handsomely finished. The Steam Thermometers have both Temperature and Pressure Scales.

Fig. 2.

PRICE LIST.

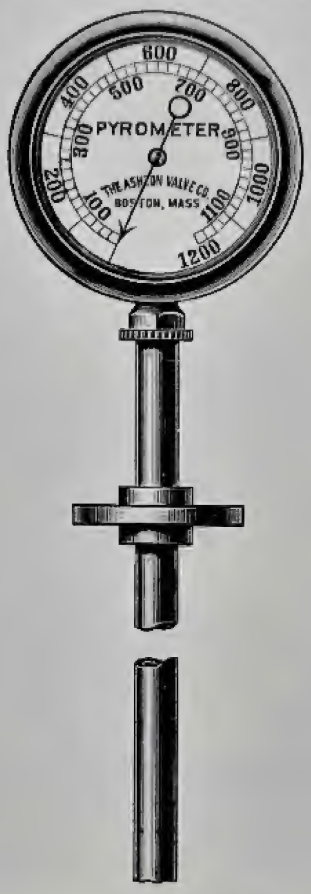
Fig.	Description.	Per Doz.
1	Straight Stem Hot Water Thermometer	$36.00
2	Straight Stem Steam Thermometer with Pressure Scale	39.00
3	Angle Stem Hot Water Thermometer	42.00
4	Angle Stem Steam Thermometer with Pressure Scale	45.00

Write for Discounts

These Thermometers are graduated only to a maximum of 260°. Higher graduations are special and will be quoted on application.

The Ashton Pyrometers.

500 to 3,000 Degrees.



Adapted for Annealing Ovens, Blast Furnaces, Bakers' Ovens, Glass Works, Boiler Flues, Chimneys, etc.

Applicable to any of the various operations where a certain fixed temperature is conducive to the best result.

These Pyrometers are manufactured under the Brown patents, and are now the most widely and favorably known. They are speeially adapted for high temperatures, and are unequalled in durability and accuracy.

PRICE LIST.

			RECORDING PYROMETERS.			
Dial.	Fahr.	Price.	Diam. Charts.	Hours.	Fahr.	Price.
8 inch	1,500°	$35.00	8 inch	24	1,600°	$50
6½ "	2,000°	30.00	8 "	24	1,200°	40
6½ "	1,500°	20.00	8 "	24	800°	30
6½ "	1,200°	15.00	8 "	24	500°	30
6½ "	800°	12.00	8 "	24	250°	30

Write for Discounts.

Stems over 36 inches long in total length, $1.00 per foot extra.

IMPORTANT. When ordering, please inform us the special use and probable temperature for which you require the Pyrometer, sending a sketch when convenient, giving approximate dimensions of the tank, flue, or oven, with thickness of wall, depth of metal, and position of Pyrometer. All Pyrometers should be cleaned and tested periodically.

The Ashton Draft Gages.

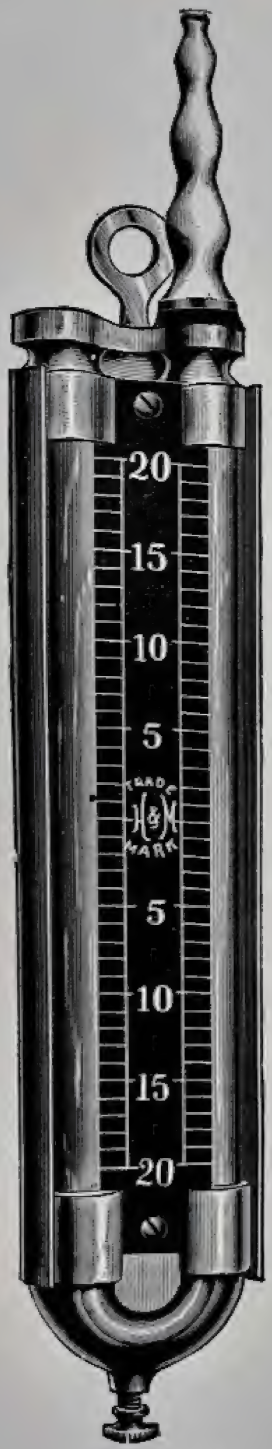


Fig. 1 Style.

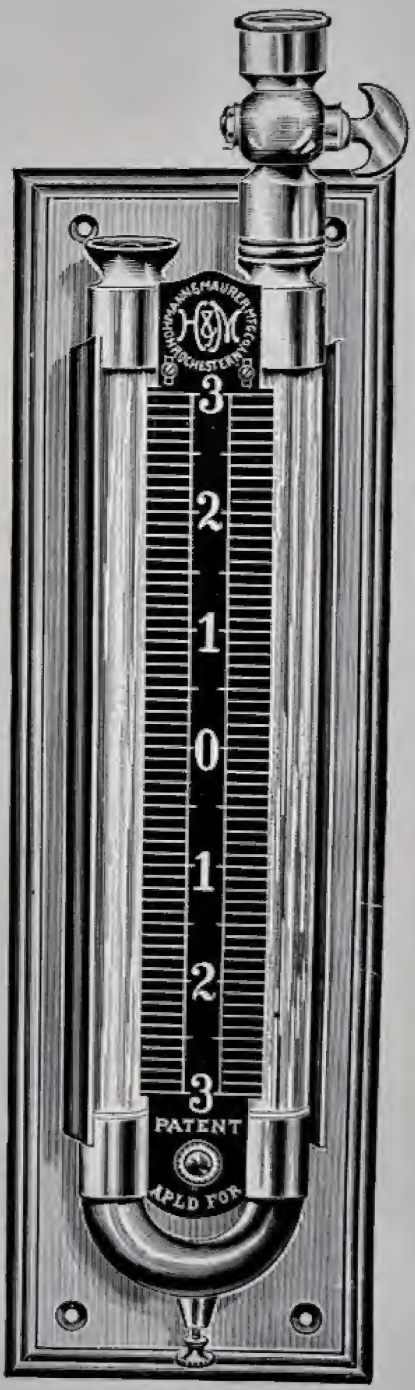
These Gages are used for indicating the draft or ascending force of smoke and gases in chimneys. It is the common practice to measure this draft in inches of water. It is also used for indicating the air pressure in closed stoke hole and up-take under grates.

PRICE LIST.

Fig. 1 Style with armor.
With 4-inch Scale, each .. $6.00
With 6-inch Scale, each .. 6.75

Fig. 2 Style without armor.
With 4-inch Scale, each .. $6.00
With 6-inch Scale, each .. 6.75

Fig. 2 Style with armor.
With 4-inch Scale, each .. $7.50
With 6-inch Scale, each .. 8.25



Style Fig. 2.

Write for Discounts.

Useful Information.

For the circumference of a circle, multiply diameter by 3.1416.

For the diameter of a circle, multiply the circumference by .31831.

For the area of a circle, multiply square of diameter by .7854.

For the side of an equal square, multiply diameter by .8862.

A gallon of water (United States standard) weighs 8⅓ pounds, and contains 231 cubic inches. A cubic foot of water weighs 62½ pounds, and contains 1,728 cubic inches, or 7½ gallons.

Each nominal horse-power of boilers requires one cubic foot of water per hour.

Ordinary speed to run pumps is 100 feet of piston per minute. To find quantity of water elevated in one minute running at 100 feet of piston per minute: Square the diameter of water cylinder in inches and multiply by 4. Example: Capacity of a five-inch cylinder is desired; the square of the diameter (5 inches) is 25, which multiplied by 4, gives 100, which is gallons per minute (approximately).

The area of the steam piston, multiplied by the steam pressure, gives the total amount of pressure exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and resistance to move the pistons at the required speed; usually reckoned at about 50 per cent.

To find the area of a required pipe, the volume and velocity of water being given, multiply the number of cubic feet of water by 144, and divide the product by the velocity in feet per minute. The area being found, it is easy to get the diameter of pipe necessary.

To find the capacity of a cylinder in gallons: Multiplying the area in inches by the length of stroke in inches will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a gallon in inches), and the product is the capacity in gallons.

To find the diameter of a pump cylinder to move a given quantity of water per minute (100 feet of piston being the speed), divide the number of gallons by 4, ther extract the square root, and the result will be the diameter in inches.

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. (Approximately, every foot elevation is called equal to one-half pound pressure per square inch.)

To find the velocity in feet per minute necessary to discharge a given volume of water in a given time, multiply the number of cubic feet of water by 144, and divide the product by the area of the pipe in inches.

To calculate the horse-power of a boiler: For horizontal, tubular, and flue boilers, dividing the number of feet of heating surface by 15 will give the horse-power; for locomotive boilers use 12 as a divisor.

Doubling the diameter of a pipe increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity.

The rate of combustion in a furnace is computed by the pounds of fuel consumed per square foot of grate per hour.

Consumption of fuel averages 7½ pounds of coal or 15 pounds dry pine wood for every cubic foot of water evaporated.

The dimensions or size of coal must be reduced and the depth of the fire increased directly, as the intensity of the draught is increased.

Condensing engines consume 2 to 6 pounds of coal per horse-power, and require 20 to 25 gallons of water to condense the steam represented by one gallon of water evaporated.

FIRING. Coal of a depth up to 12 inches is more effective than at a less depth. Admission of air above the grate increases evaporative effect, but diminishes the rapidity of it. Air admitted at bridge-wall effects a better result than when admitted at door, and when in small volumes, and in streams or currents, it arrests or prevents smoke. It may be admitted by an area of four square inches per square foot of grate. Combustion is the most complete with firings at intervals of from 15 to 20 minutes.

A SOLVENT FOR RUST. It is often very difficult and sometimes impossible to remove rust from articles made of iron. Those which are most thickly coated are most easily cleaned by being immersed in a solution, nearly saturated, of chloride of tin. The length of time they remain in this bath is determined by the thickness of the coating of rust. Generally 12 to 24 hours is long enough. The solution ought not to contain a great excess of acid, if the iron itself be not attacked. On taking them from the bath the articles are rinsed, first in water, then in ammonia, and quickly dried. The iron, when thus treated, has the appearance of dull silver. A simple polishing gives it its normal appearance.

TO REMOVE RUST FROM STEEL. Brush the rusted steel with a paste composed of one-half ounce cyanide of potassium, one-half ounce castile soap, one ounce whiting, and enough water to make a paste. Then wash the steel in a solution of one-half ounce cyanide of potassium in two ounces water.

TO MAKE TIGHT STEAM JOINTS, ETC. Take white lead ground in oil, incorporate as much manganese (black oxide) as possible, adding a small portion of litharge. Knead it with the hand, dusting the board with red lead. The mass is made into a small roll and laid on the plate, first oiling the plate with linseed oil. It then can be screwed and pressed into position.

RUST JOINT (for Quick Setting). Sal ammoniac, powdered, one pound; flour of sulphur, two pounds; iron borings, 80 pounds; mix to a paste with water. **(Slow Setting.)** Sal ammoniac, two pounds; sulphur, one pound; iron borings, 200 pounds. The latter is best if the joint is not needed for use at once.

TO CLEAN BRASS (U. S. Government Method). Make a mixture of one part common nitric acid and one-half part sulphuric acid in a stone jar, having also a pail of fresh water and a box of sawdust. Dip the articles into the acid, then soak them in the water, and finally rub them in the sawdust, and they will take on a brilliant color. If the brass is greasy, it must be first dipped into a strong solution of potash and soda in water, and then rinsed, so that the grease may be removed, leaving the acid free to act.

Rules for the Management and Care of Steam Boilers as Adopted by Hartford Steam Boiler Inspection and Insurance Co.

1. CONDITION OF WATER. The first duty of an engineer, when he enters his boiler-room in the morning, is to ascertain how many gages of water there are in his boilers. *Never unbank nor replenish the fires until this is done.* Accidents have occurred and many boilers have been entirely ruined from neglect of this precaution.

2. LOW WATER. In case of low water, immediately cover the fires with ashes, or, if no ashes are at hand, use *fresh coal*, and close ash-pit doors. Don't turn on the feed under any circumstances, nor tamper with nor open the safety valve. Let the steam outlets remain as they are.

3. IN CASE OF FOAMING. Close throttle and keep closed long enough to show true level of water. If that level is sufficiently high, feeding and blowing will usually suffice to correct the evil. In case of violent foaming, caused by dirty water, or change from salt to fresh, or *vice versa*, in addition to the action above stated, check draft and cover fires with fresh coal.

4. LEAKS. When leaks are discovered they should be repaired as soon as possible.

5. BLOWING OFF. Clean furnace and bridge wall of all coal and ashes. Allow brickwork to cool down for two hours at least before opening blow. A pressure exceeding twenty pounds should not be allowed when boilers are blown out. Blow out at least once in two weeks. In case the feed becomes muddy, blow out six or eight inches every day. When surface blow-cocks are used they should be often opened for a few moments at a time.

6. FILLING UP THE BOILERS. After blowing down *allow the boilers to become cool* before filling again. Cold water pumped into hot boilers is very injurious from sudden contraction.

7. EXTERIOR OF BOILER. Care should be taken that no water comes in contact with the exterior of the boiler, either from leaky joints or other causes.

8. REMOVING DEPOSIT AND SEDIMENT. In tubular boilers the hand holes should be often opened, and all collections removed, and fire-plates carefully cleaned. Also, when boilers are fed in front and blown off through the same pipe, the collection of mud or sediment in the rear end should be often removed.

9. SAFETY VALVES. Raise the safety valves cautiously and frequently, as they are liable to become fast in their seats, and useless for the purpose intended.

10. SAFETY VALVE AND PRESSURE GAGE. Should the gage at any time indicate the limit of pressure allowed by this Company, see that the safety valves are blowing off. In case of difference notify the Company's inspector.

11. GAGE COCKS, GLASS GAGE. Keep gage cocks clear and in constant use. Glass gages should not be relied on altogether.

12. BLISTERS. When a blister appears there must be no delay in having it carefully examined, and *trimmed* or *patched*, as the case may require.

13. CLEAN SHEETS. Particular care should be taken to keep sheets and parts of boilers exposed to the fire perfectly clean; also all tubes, flues, and connections well swept. This is particularly necessary where wood or soft coal is used for fuel.

14. GENERAL CARE OF BOILERS AND CONNECTIONS. Under all circumstances keep the gages, cocks, etc., clean and in good order, and things generally in and about the engine and boiler-room in a neat condition.

15. GETTING UP STEAM. In preparing to get up steam after boilers have been open, or out of service, great care should be exercised in making the man- and hand-hole joints. Safety valve should then be opened, and blocked open, and the necessary supply of water run in or pumped into the boilers until it shows at second gage in tubular and locomotive boilers; a higher level is advisable in vertical tubulars as a protection to the top end of the tubes. After this is done fuel may be placed upon the grate, dampers opened, and fires started. If chimney or stack is cold and does not draw properly, burn some oily waste or light kindlings at the base. Start fires in ample time so it will not be necessary to urge them unduly. When steam issues from the safety valve lower it carefully to its seat and note pressure and behavior of steam gage.

If there are other boilers in operation, and stop-valves are to be opened to place boilers in connection with others on a steam pipe line, watch those recently fired up until pressure is up to that of the other boilers to which they are to be connected; and when that pressure is attained open the stop-valves *very slowly and carefully.*

Standard Dimensions of Wrought Iron Steam, Gas, and Water Pipe.

Nominal Diameter in inches.	Thickness in inches.	Actual Internal Diameter in inches.	Actual External Diameter in inches.	Size of Tap Drill.	Threads per inch.	Pitch of Threads.
1/8	.068	.270	.405	11/32	27	.037
1/4	.088	.364	.540	7/16	18	.056
3/8	.091	.494	.675	19/32	18	.056
1/2	.109	.623	.840	23/32	14	.071
3/4	.113	.824	1.050	15/16	14	.071
1	.134	1.048	1.315	1 3/16	11 1/2	.087
1 1/4	.140	1.380	1.660	1 1/2	11 1/2	.087
1 1/2	.145	1.611	1.900	1 23/32	11 1/2	.087
2	.154	2.067	2.375	2 3/16	11 1/2	.087
2 1/2	.204	2.468	2.875	2 5/8	8	.125
3	.217	3.061	3.500	3 1/4	8	.125
3 1/2	.226	3.548	4.000	3 3/4	8	.125
4	.237	4.026	4.500	4 1/4	8	.125
4 1/2	.247	4.508	5.000	4 3/4	8	.125
5	.259	5.045	5.563	5 5/16	8	.125
6	.280	6.065	6.625	6 3/8	8	.125
7	.301	7.023	7.625	7 3/8	8	.125
8	.322	7.982	8.625	8 3/8	8	.125
9	.344	9.001	9.688	9 7/16	8	.125
10	.366	10.019	10.750	10 1/2	8	.125

Properties of Metals.

Kind of Metal.	Melting Point, Degrees Fahr.	Weight in pounds per Cubic Foot.	Weight in pounds per Cubic Inch.	Tensile Strength.
Aluminum	1140	166.5	.0963	15,000– 30,000
Antimony	810–1000	421.6	.2439	1,050
Brass (average)...	1500–1700	523.2	.3027	30,000– 45,000
Copper	1930	552.0	.3195	30,000– 40,000
Gold (pure).....	2100	1200.9	.6949	20,380
Iron, cast.....	1900–2200	450.0	.2604	20,000– 35,000
Iron, wrought....	2700–2830	480.0	.2779	35,000– 60,000
Lead	618	709.7	.4106	1,000– 3,000
Mercury	–39	846.8	.4900	....
Nickel	3000	548.7	.3175	....
Silver	1800	655.1	.3791	40,000
Steel	2370–2685	489.6	.2834	50,000–120,000
Tin	475	458.3	.2652	5,000
Zinc	780	436.5	.2526	3,500

NOTE.—The wide variations in tensile strength are due to the different forms and qualities of the metal tested. In the case of lead, the lowest strength is for lead cast in a mold, the highest for wire drawn after numerous workings of the metal. With steel it varies with the proportion used in mixing, which is varied according to the grade required. Mercury becomes liquid at 39 degrees below zero.

United States Standard Screw Threads.

Diameter of Screw in inches.	Number of Threads per inch.	Diameter at Bottom of Threads.	Size of Tap Drill.	Area at Bottom of Thread in square inches	Safe Load on Threaded Bolt on Basis of 6,000 Pounds' Stress per Square Inch of Section at Root of Thread.
1/4	20	.185	3/16	.0269	.162
5/16	18	.240	1/4	.0452	.270
3/8	16	.294	5/16	.0679	.408
7/16	14	.345	11/32	.0935	.558
1/2	13	.400	13/32	.1257	.756
9/16	12	.454	15/32	.1619	.977
5/8	11	.507	1/2	.2019	1.210
3/4	10	.620	5/8	.3019	1.520
7/8	9	.731	3/4	.4197	1.810
1	8	.838	27/32	.5515	3.300
1 1/8	7	.939	15/16	.6925	4.160
1 1/4	7	1.064	1 1/16	.8892	5.350
1 3/8	6	1.158	1 5/32	1.0532	6.340
1 1/2	6	1.283	1 9/32	1.2928	7.770
1 5/8	5 1/2	1.389	1 13/32	1.5153	9.090
1 3/4	5	1.490	1 1/2	1.7437	10.470
1 7/8	5	1.615	1 5/8	2.0485	12.300
2	4 1/2	1.711	1 23/32	2.2993	13.800

Machine Screws.

Screw Gage Size.	Number of Threads per inch.	Outside Diameter in inches.	Approximate Diameter in inches.	Tap Drill, B. & S. Drill Gage.
2	56	.0842	5/64	No. 49
3	48	.0973	3/32	" 45
4	36	.1105	7/64	" 42
5	36	.1236	1/8	" 38
6	32	.1368	9/64	" 35
7	32	.1500	5/32	" 30
8	32	.1631	5/32	" 29
9	30	.1763	11/64	" 27
10	24	.1894	3/16	" 25
11	24	.20206	13/64	" 21
12	24	.2158	7/32	" 17
13	22	.2289	15/64	" 15
14	20	.2421	15/64	" 13
15	20	.2552	1/4	" 8
16	18	.2684	17/64	" 6
17	18	.2816	9/32	" 2
18	18	.2947	19/64	" 1
19	18	.3079	5/16	1/4"
20	16	.3210	21/64	1/4"
22	16	.3474	11/32	9/32"
24	16	.3737	3/8	19/64"
26	16	.4000	13/32	21/64"
28	14	.4263	27/64	11/32"
30	14	.4526	7/16	23/64"

French or Metric Measures

The metric unit of length is the metre = 39.37 inches.
The metric unit of weight is the gram = 15.432 grains.

The following prefixes are used for subdivisions and multiples: Milli = $\frac{1}{1000}$, Centi = $\frac{1}{100}$, Deci = $\frac{1}{10}$, Deca = 10, Hecto = 100, Kilo = 1000, Myria = 10,000.

French and British (and American) Equivalent Measures.

MEASURES OF LENGTH.

FRENCH.	BRITISH AND U. S.
1 metre	= 39.37 inches, or 3.28083 feet, 1.09361 yards.
.3048 metre	= 1 foot.
1 centimetre	= .3937 inch.
2.54 centimetres	= 1 inch.
1 millimetre	= .03937 inch, or 1-25 inch nearly.
25.4 millimetres	= 1 inch.
1 kilometre	= 1093.61 yards, or .62137 mile.

MEASURES OF WEIGHT.

FRENCH.		BRITISH AND U. S.
1 gramme	=	15.432 grains.
.0648 gramme	=	1 grain.
28.35 grammes	=	1 ounce avoirdupois.
1 kilogramme	=	2.2046 pounds.
.4536 kilogramme	=	1 pound.
1 tonne or metric ton 1000 kilogrammes	=	.9842 ton of 2240 pounds. 19.68 cwts. 2204.6 pounds.
1.016 metric tons 1016 kilogrammes	=	1 ton of 2240 pounds.

MEASURES OF CAPACITY.

FRENCH.		BRITISH AND U. S.
1 litre (= 1 cubic decimetre)	=	61.023 cubic inches. .03531 cubic foot. .2642 gallon (American). 2.202 pounds of water at 62° F.
28.317 litres	=	1 cubic foot.
4.543 litres	=	1 gallon (British).
3.785 litres	=	1 gallon (American).

WEIGHT AND PRESSURE PER UNIT OF AREA.

FRENCH.	BRITISH AND U. S.
1 gramme per square millimetre	= 1.422 lbs. per square inch.
1 kilogramme per square millimetre	= 1422.32 " " "
1 kilogramme per square centimetre	= 14.223 " " "
1.0335 kilogrammes per square centimetre (1 atmosphere)	= 14.7 " " "
0.070308 kilogramme per square centimetre	= 1 " " "

Decimal Equivalents of Millimetres and Fractions of Millimetres.

$\frac{1}{100}$ mm. = .0003937 inch.

mm.	Inches.	mm.	Inches.	mm.	Inches.
$\frac{1}{50}$	= .00079	$\frac{26}{50}$	= .02047	2	= .07874
$\frac{2}{50}$	= .00157	$\frac{27}{50}$	= .02126	3	= .11811
$\frac{3}{50}$	= .00236	$\frac{28}{50}$	= .02205	4	= .15748
$\frac{4}{50}$	= .00315	$\frac{29}{50}$	= .02283	5	= .19685
$\frac{5}{50}$	= .00394	$\frac{30}{50}$	= .02362	6	= .23622
$\frac{6}{50}$	= .00472	$\frac{31}{50}$	= .02441	7	= .27559
$\frac{7}{50}$	= .00551	$\frac{32}{50}$	= .02520	8	= .31496
$\frac{8}{50}$	= .00630	$\frac{33}{50}$	= .02598	9	= .35433
$\frac{9}{50}$	= .00709	$\frac{34}{50}$	= .02677	10	= .39370
$\frac{10}{50}$	= .00787	$\frac{35}{50}$	= .02756	11	= .43307
$\frac{11}{50}$	= .00866	$\frac{36}{50}$	= .02835	12	= .47244
$\frac{12}{50}$	= .00945	$\frac{37}{50}$	= .02913	13	= .51181
$\frac{13}{50}$	= .01024	$\frac{38}{50}$	= .02992	14	= .55118
$\frac{14}{50}$	= .01102	$\frac{39}{50}$	= .03071	15	= .59055
$\frac{15}{50}$	= .01181	$\frac{40}{50}$	= .03150	16	= .62992
$\frac{16}{50}$	= .01260	$\frac{41}{50}$	= .03228	17	= .66929
$\frac{17}{50}$	= .01339	$\frac{42}{50}$	= .03307	18	= .70866
$\frac{18}{50}$	= .01417	$\frac{43}{50}$	= .03386	19	= .74803
$\frac{19}{50}$	= .01496	$\frac{44}{50}$	= .03465	20	= .78740
$\frac{20}{50}$	= .01575	$\frac{45}{50}$	= .03543	21	= .82677
$\frac{21}{50}$	= .01654	$\frac{46}{50}$	= .03622	22	= .86614
$\frac{22}{50}$	= .01732	$\frac{47}{50}$	= .03701	23	= .90551
$\frac{23}{50}$	= .01811	$\frac{48}{50}$	= .03780	24	= .94488
$\frac{24}{50}$	= .01890	$\frac{49}{50}$	= .03858	25	= .98425
$\frac{25}{50}$	= .01969	1	= .03937	26	= 1.02362

10 mm. = 1 Centimetre = 0.3937 inches.
10 cm. = 1 Decimetre = 3.937 "
10 dm. = 1 Metre = 39.37 "
25.4 mm. = 1 English inch.
1 Metre = 39.37 inches.
.9144 Metre = 1 yard.
.6096 Metre = 24 inches.

To reduce inches to centimetres, multiply by 2.54.

Telegraph Cipher

CODE FOR

THE ASHTON VALVE COMPANY,

271 Franklin Street, Boston, Mass., U. S. A.

Cable Address: "ASHTON," BOSTON.

SPECIAL NOTICE.

When ordering goods, use plain English words or figures for the NUMBER or QUANTITY WANTED.

Use "WESTERN UNION" or "A. B. C. TELEGRAPH CODE" for general information, directions, and instructions.

PRELIMINARY.

Revocable.	At what price, what quantity, and how soon can you ship?
Roofing.	Ship all you possibly can by quickest route.
Roofless.	Ship at first opportunity by cheapest route.
Roominess.	Ship at once by express.
Ropewalk.	Ship at once by fast freight.
Rotate.	Hold shipment Order No. —; await particulars by mail.
Restless.	Advise regarding shipment of our Order No. —.
Roving.	Trace shipment of our Order No. —.

Always order by NUMBER of Valve, give PRESSURE to set Valve, and state whether FLANGED or SCREW end.

Africa,	Page 15,	No. 20.	Stationary Iron Valve.
Alaska,	" 16,	" 17.	Stationary Steel Superheat Valve.
America,	" 30,	" 4.	Stationary and Marine Muffler Attachment.
Arabia,	" 17,	" 20A.	Stationary Iron Valve, Duplex Pattern.
Asia,	" 18,	" 6.	Stationary Composition Valve, without lock-up.
Austria,	" 18,	" 7.	Stationary Composition Valve, with cap only.
Belgium,	" 19,	" 8.	Stationary Composition Valve, with lock-up.
Brazil,	" 19,	" 9.	Stationary Composition Valve, with lock-up and side outlet.
Canada,	" 36,	" 10.	Cylinder Relief Composition Valve.
Chili,	" 32,	" 11.	Yoke.
Ceylon,	" 40,	" 13.	Blow-off Valve, Composition Pattern.
Crete,	" 21,	" 14.	Steam Heating Valve.
Costa,	" 21,	" 14.	Steam Heating Valve, Approved Police Pattern.
Cuba,	" 29,	" 15.	Marine Composition Valve.
Denmark,	" 26,	" 16.	Marine Iron Valve.
Dahomey,	" 28,	" 16A.	Marine Iron Valve, Duplex Pattern.

England,	Page 37,	No. 18.	Snifting Composition Valve.
Germany,	" 34,	" 22.	Water Relief Iron Valve.
Greece,	" 38,	" 23.	Ammonia Relief Valve.
Grenada,	" 33,	" 24.	Water Relief Composition Valve.
Ireland,	" 39,	" 25	Hydraulic Valve Composition (Light Pattern).
India,	" 39,	" 25A.	Hydraulic Valve Steel (Heavy Pattern).
Mexico,	" 43,	" 28.	Open Pop "Loco" Valve.
Peru,	" 41,	" 30.	Muffled "Loco" Valve.
Malta,	" 45,	" 28M.M.	Open Pop "Loco" Valve.
Monaco,	" 44,	" 30M.M.	Muffled "Loco" Valve.
Montenegro,	" 47,	" 28I.L.	Open Pop "Loco" Valve.
Morocco,	" 46,	" 30I.L.	Muffled "Loco" Valve.
Persia,	" 20,	" 31.	Steam Vehicle Valve, Open Discharge.
Poland,	" 20,	" 32.	Steam Vehicle Valve, Pipe Outlet.
Servia,	" 50,	" 33.	Car Heating Relief Valves.
Sicily,	" 49,	" 35.	"Loco" Steam Chest Vacuum Valve.
Rome,	—	—	Screw Ends.
Russia,	—	—	Flanged Ends.
Spain,	—	—	Nickel Seated.
Turkey,	Page 31,	—	Testing Clamps.

For sizes and pressure see page 117.

Style of Cases for Gages and Clocks.

Improved Single Spring Bourdon Pressure or Vacuum Gages.

Arthur	Iron Case, Brass Ring.
Benny	Iron Case, Nickel Plate Ring.
Charlie	Brass Case.
David	Nickel Plate Case.
Edward	Brass Deep Case, O. G. or Octagon Ring.
Frank	Nickel Plate Deep Case, O. G. or Octagon Ring.

The Ashton Patent or Double Spring Bourdon Pressure Gages.

Gertrude	Iron Case, Japanned.
Hattie	Iron Case, Nickel Plate Ring.
Isabel	Brass Case.
Jennie	Nickel Plate Case.
Kate	Brass Deep Case, O. G. or Octagon Ring.
Louise	Nickel Plate Deep Case, O. G. or Octagon Ring.

NOTE. — When ordering Gages, be particular in stating diameter of Dial and style of Case.

Atlanta,	Page 55,	No. 50.	Ashton Patent Gage.
Alleghany,	" 58,	" 51.	Ashton Single Spring Bourdon Steam and Pressure Gage.
Arlington,	" 20,	" 51A.	Ashton Single Spring Bourdon Steam Gage Steam Vehicle Pattern.
Augusta,	" 20,	" 51A.	Ashton Single Spring Bourdon Air Gage, Steam Vehicle Pattern.
Augustine,	" 20,	" 66A.	Duplex Steam and Air Pressure Gages.
Austin,	" 56,	" 52.	Ashton Improved Double Spring Gage, Lane Improvement.
Boston,	" 59,	" 53.	Ashton Improved Vacuum Gage.
Bangor,	" 60,	" 54.	Ashton Compound Pressure and Vacuum Gage.
Baltimore,	" 61,	" 55.	Ashton Hydraulic Gage.
Brunswick,	" 62,	" 56.	Ashton Combination Water Pressure Gage.
Braintree,	" 63,	" 57.	Ashton Ammonia Gage.

Chicago,	Page 64,	No. 58.	Ashton Pyrometer Steam Gage.
Columbia,	" 66,	" 59.	Ashton Standard Test Gage.
Cincinnati,	" 67,	" 59A.	Ashton Standard Test Gage, Pocket Pattern.
Concord,	" 65,	" 60.	Ashton Altitude Gage.
Dover,	" 78,	" 61.	Ashton Chemical Gage.
Detroit,	" 68,	" 62.	Ashton Duplex Air Brake Gage, Standard Style.
Danbury,	" 68,	" 62.	Ashton Duplex Air Brake Gage, High Speed Style.
Denver,	" 69,	" 62A.	Ashton Triplex Air Brake and Train Signal Gage.
Decatur,	" 75,	" 63.	Locomotive and Marine Clock.
Elyria,	" 77,	" 64.	Improved Engine Register.
Erie,	" 76,	" 65.	Square Counters.
Eutaw,	" 57,	" 66.	Ashton Locomotive Vertical Reading Gage.
Frisco,	" 74,	" 67.	Ashton Crank Index.
Fargo,	" 70,	" 68.	Ashton Air Brake Inspector's Test Gage.
Galveston,	" 71,	" 69.	Ashton Illuminated Dial Gage.
Guthrie,	" 72,	" 73.	Ashton Pressure Recording Gage.
Grafton,	" 72,	" 74.	Ashton Pressure Recording and Indicating Gage.
Gloucester,	" 92,	" 77.	Ashton Gas Proving Pump and Outfit.
Hartford,	" 73,	" 78.	Ashton Ideal Alarm Gage.

NOTE. — Specify ash, oak, or walnut, and size dial.

Ipswich,	Page 79,	—	Gage Tablet, Style A, for two Instruments.
Joplin,	" 80,	—	Gage Tablet, Style B, for three Instruments.
Kingston,	" 81,	—	Gage Tablet, Style C, for four Instruments.
Harrisburg,	" 84,	—	Gage Frame, Style No. 1, for four Instruments.
Haverhill,	" 85,	—	Gage Frame, Style No. 2, for five Instruments.
Lawrence,	" 82,	—	Gage Tablet, Style D, for five Instruments.
Lowell,	" 83,	—	Gage Tablet, Style E, for six Instruments.

NOTE. — Specify marble, slate, or marbleized slate, and size dial.

Macon,	Page 88-89,	No. 79.	Ashton Improved Gage Tester.
Meriden,	" 90,	—	Ashton Standard Lever Test Pump, Style No. 1.
Mobile,	" 91,	—	Ashton Lever Pump, Style No. 2.
Medford,	" 91,	—	Ashton Screw Pump, Style No. 3.
Mansfield,	" 87,	—	Ashton Inspector's Testing and Proving Outfit.
Manchester,	" 93,	No. 90.	Ashton Common Steam Whistle.
Natick,	" 94,	" 91.	Ashton Chime Whistle.
Natchez,	" 95,	" 92.	Ashton Organ Whistle.
Needham,	" 96,	—	Ashton Siphons and Cocks.
Newport,	" 97,	No. 93.	Ashton Compression Gage Cocks.
New York,	" 97,	" 94.	Gage Hand Pullers.
Newton,	" 98,	—	Ashton Water Gages.
Orleans,	" 99,	—	Portable Boiler Test Pump.
Portland,	" 100,	—	Ashton Water Columns.
Pittsburg,	" 101,	—	Ashton Scotch Water Glass Tubes.
Prescott,	" 102,	—	Thompson Improved Indicators.
Raleigh,	" 103,	—	Aluminum Reducing Wheel.
Scranton,	" 103,	—	Amsler's Polar Planimeter.
Syracuse,	" 103,	—	Indicator Spring.
Savannah,	" 104,	—	Ashton Steam and Hot Water Thermometers.
Tacoma,	" 105,	—	Ashton Pyrometers.
Wilmington,	" 106,	—	Ashton Draft Gages.

Where Several Figures or Styles are Mentioned in Catalogue.

Uno	Figure 1 or Style 1.
Duo	Figure 2 or Style 2.
Trio	Figure 3 or Style 3.
Quarto	Figure 4 or Style 4.

SIZE IN INCHES OF DIAMETER OF VALVES, OPENINGS, FLANGES, DIALS OF GAGES AND CLOCKS, BELL OF WHISTLE, AND INCHES OF VACUUM.

Adams	1/8 in.	**Polk**	5 1/2 in.
Buchanan	1/4 "	**Roosevelt**	6 "
Cleveland	3/8 "	**Taylor**	6 3/4 "
Fillmore	1/2 "	**Tyler**	7 "
Grant	3/4 "	**Tilden**	8 "
Garfield	1 "	**Van**	8 1/2 "
Hayes	1 1/4 "	**Buren**	9 "
Harrison	1 1/2 "	**Washington**	10 "
Jackson	2 "	**Wilson**	12 "
Johnson	2 1/2 "	**Webster**	14 "
Jefferson	3 "	**Walton**	16 "
Lincoln	3 1/2 "	**Wellington**	18 "
Madison	4 "	**Whittier**	20 "
Monroe	4 1/2 "	**Watkins**	24 "
McKinley	5 "		

Monogram — Name on Dial.

PRESSURE IN POUNDS OF VALVES AND GAGES.

Antonio	5 lbs.	**Mackinaw**	115 lbs.
Arkansas	10 "	**Maumee**	120 "
Ausable	15 "	**Mississippi**	125 "
Bay	20 "	**Missouri**	130 "
Champlain	25 "	**Mohawk**	135 "
Cheyenne	30 "	**Nile**	140 "
Chippewa	35 "	**Ohio**	145 "
Colorado	40 "	**Ontario**	150 "
Congo	45 "	**Ottawa**	155 "
Connecticut	50 "	**Potomac**	160 "
Danube	55 "	**Rhine**	165 "
Delta	60 "	**Rio**	170 "
Elbe	65 "	**Rouge**	175 "
Firth	70 "	**Saranac**	180 "
Ganges	75 "	**Savannah**	185 "
Housatonic	80 "	**Seine**	190 "
Hudson	85 "	**Tennessee**	195 "
Humber	90 "	**Thames**	200 "
Huron	95 "	**Waco**	225 "
Indus	100 "	**Winnipeg**	250 "
Lena	105 "	**Wurtemburg**	300 "
Mackenzie	110 "		

HYDRAULIC PRESSURE.

Cabinet	400 lbs.	**Danger**	2,000 lbs.
Cakes	500 "	**Dauphin**	2,500 "
Caldron	600 "	**Doctor**	3,000 "
Camera	800 "	**Donor**	3,500 "
Dagger	1,000 "	**Doric**	4,000 "
Damage	1,200 "	**Dormer**	5,000 "
Dandy	1,500 "	**Dowry**	10,000 "

Specify tons and size of ram in plain English.

These Tablets, like those on the following pages, are some of the most attractive designs for gages, both as to neatness of appearance and economy of space. They can be furnished in any style of marble or slate desired, and the prices include the necessary acorn nuts and gage screws. Name Plates and wall bolts are always extra.